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## Monterey, California



# THESIS

AN ANALYSIS OF REENLISTMENT AND RESERVE  
INTENTIONS  
OF FIRST-TERM ENLISTED PERSONNEL

by

Mark W. Lamboni

June 1987

Thesis Advisor  
Co-Advisor

George W. Thomas  
Stephen L. Mehay

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An Analysis of Reenlistment and Reserve Intentions  
of First-term Enlisted Personnel

by

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Lieutenant Commander, United States Navy  
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Submitted in partial fulfillment of the  
requirements for the degree of

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## ABSTRACT

This thesis investigates military affiliation intentions of first-term enlisted servicemen in all four branches of service who have less than a year remaining on their initial enlistment contract. The investigation is accomplished in two sequences:

1. The study of servicemen most likely to reenlist, and of those most likely to separate; and
2. Of those servicemen who are classified as not likely to reenlist, the likelihood of their joining the reserves.

These two decisions are analyzed using demographic, tenure, cognitive/affective, economic, and employment alternative variables as explanatory factors. The analysis is completed by using a probit non-linear estimation technique which calculates the likelihood of a serviceman choosing to continue, or discontinue, military service given his set of specific characteristics. The results indicate potential policy variables that may be targeted by manpower policy planners to increase the likelihood of continued military affiliation either by reenlistment or reserve force participation.

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## **I. INTRODUCTION**

### **A. GENERAL**

With the advent of the All Volunteer Force in 1973, the U.S. armed forces have had to expend increasingly higher levels of defense appropriations to attract and maintain the necessary quantity and quality mix of personnel to meet national security objectives. Being an entirely volunteer system, manpower policy makers must now, more than ever, carefully weigh policy decisions which affect areas such as compensation and quality of life measures which servicemen use in comparing the options of a military versus civilian career.

The effectiveness of the military forces is dependent in large measure to the skill levels and experience of its personnel. The technological advances much in evidence throughout the four branches of service necessitates the need to not only attract quality people, but more importantly to retain its highly trained and experienced core of personnel. Thus, controlling turnover in the military is a prime objective for manpower planners. Policies, especially those which affect military pay, benefits, and life quality measures in times of increasingly scrutinized defense appropriations must be accurately targeted at factors which weigh most heavily on servicemembers' affiliation decisions. This thesis investigates the affiliation intentions of first-term enlisted servicemen, with one year or less remaining on their initial contract, to identify factors which most directly affect their intentions to continue such affiliation.

### **B. DATA BASE**

The data used in this thesis was extracted from a 1985 DoD Survey of Officer and Enlisted Personnel conducted for the office of the Assistant Secretary of Defense (Force Management and Personnel) (OASD) (FM&P) by the Defense Manpower Data Center (DMDC). This 1985 DoD Survey was one of several surveys conducted as part of the first large-scale survey effort to fulfill the needs for information on the total population directly involved with military life in the active-duty forces. This survey is particularly useful in investigating:

- The response of military personnel to changes in military compensation and benefits enacted in recent years;
- Factors affecting retention of active-duty personnel;

- Differences in career orientations, attitudes, and experiences between members of different subgroups, e.g. minorities, gender, age, etc.; and
- The demographic, household, familial and other characteristics of military personnel.

### **C. RESEARCH QUESTIONS**

This thesis analyzes to what extent, if any, and the magnitude that demographic, tenure, cognitive/affective, economic, and employment alternative factors have on the military affiliation intentions of first-term enlisted servicemen. Reenlistment intentions and intentions of joining the reserves have been dichotomized into yes/no categories. Chapter IV analyzes reenlistment intentions, while Chapter V analyzes reserve affiliation intentions.

### **D. METHODOLOGY**

The model developed to investigate reenlistment and reserve affiliation intentions is a binary-choice model. This model requires the calculation of probabilities (or the likelihood) of a serviceman taking a specific action, reenlist or join the reserves, given his set of characteristics. In view of the availability of individual level data and a dichotomous dependent variable, the non-linear probit model is applied.

### **E. LITERATURE REVIEW**

To develop the conceptual framework for this thesis, factors that have been investigated, and the models developed by both civilian and military researchers in their analyses of personnel turnover were explored. Those factors and/or variables found in the literature search which also were available in the 1985 DoD Survey were used as the basis for candidate variables to develop the final reenlistment and reserve affiliation models.

### **F. ORGANIZATION OF THE STUDY**

Chapter II presents the literature review in greater detail and includes alternative views of the turnover problem in both civilian and military personnel applications. Discussions of turnover research modeling, as well as military research efforts in both the active and reserve forces, close out the chapter.

Chapter III further develops the Research Objectives of this thesis, describes the Data Base used, and looks at the Methodology and Statistical Analysis applied. The five categories of candidate variables for investigation are discussed and subsequently reduced to a final set of explanatory variables. The formulation of the dependent variables for the reenlistment and reserve decisions are also discussed.



Chapters IV and V describe the analyses of reenlistment and reserve affiliation intentions, respectively, and include discussions of model estimations and results of these analyses. An analysis of the predictive accuracy of the models close out each of these chapters.

The final chapter, Chapter VI, summarizes conclusions drawn from results of the model estimations, citing factors which were shown to significantly affect the military affiliation intentions of first-term servicemen in the four service branches. A discussion of manpower policy implications and recommendations for future research efforts conclude this thesis.

## **II. REVIEW OF LITERATURE**

### **A. BACKGROUND**

Studies into the phenomena of employee turnover have been the object of research for over 70 years, being addressed in an estimated 2000 publications (cf. Muchinsky and Morrow, 1980). These studies have not been well integrated however, being divided between various disciplines, including economics, psychology, and sociology primarily (Muchinsky and Morrow, 1980; Williams and Hazen, 1986). There remains a general disagreement among researchers on the composition of turnover or the best model or approach for thoroughly analyzing such a complex subject area. For this research effort, turnover and quitting are considered equivalent, voluntary individual actions.

The existing literature has looked at turnover from a myriad of perspectives producing a multitude of relationships between actual turnover and explanatory factors such as individual characteristics, work-related factors, and economic factors. Investigation into the basic job satisfaction-turnover relationship has sparked research into two ancillary antecedent processes. The two are the job turnover process, and the organizational commitment process. Additionally, many researchers have now focused their efforts on analyzing the adequacy of turnover models instead of duplicating support for, or rejection of, correlating variables of turnover (Mobley, Griffeths, Hand and Meglino, 1979).

### **B. GENERAL TURNOVER RESEARCH**

Muchinsky and Morrow (1980) highlighted the narrowness of turnover studies, citing the propensity of psychologists to study turnover and its relationship to job satisfaction, personality, intelligence, aptitude, and biographical data. Sociologists tend to focus on the impact of structural determinants on turnover, while economists have emphasized the relationship between turnover, the business cycle, and inter-industry quit rates.

While the word turnover may conjure up negative images of good people turning their backs on an organization and leaving, Abelson and Baysinger (1984) show that

TABLE 1  
POTENTIAL NEGATIVE CONSEQUENCES OF TURNOVER

- Increased costs: recruiting, selecting, training replacements.
- Demoralization: those remaining may question their own position in the organization and initiate search strategies for better positions.
- Negative public relations: are the military services a good place to work?
- Operational disruption: discontinuity in decision-making, unqualified replacements, less developed job skills.
- Strategic opportunity costs: unable to pursue growth strategies due to insufficient manpower.
- Decreased employee social integration: instability in work groups caused by turnover may make establishing close social relationships at work more difficult.
- Undifferentiated turnover control strategies: incurring unnecessary costs due to ineffective turnover control strategies--poor analysis of why turnover occurs.

turnover can be functional or dysfunctional for an organization. Dysfunctional turnover is the voluntary separation of people the organization desires to retain. A summary of potential negative consequences is presented in Table 1 (cf. Mowday, 1984). Conversely, functional turnover may result in positive consequences for the organization as poor or undesirable performers quit or are forced out. This ostensibly could lead to greater effectiveness and efficiency within the organization overall. Several studies have dismissed as an assumption that all turnover is dysfunctional (Dalton, Tudor and Krackhardt, 1982; Muchinsky and Morrow, 1980). Abelson and Baysinger (1984) expand their study by incorporating the element employee job performance as a turnover factor, hypothesizing that if employee performance is high, turnover is considered dysfunctional, while turnover of poor performers is considered functional for an organization.

Mowday (1984) finds at least two problems with only viewing turnover in a negative sense. First, it neglects the number of potential positive outcomes associated with turnover as suggested in Mobley (1982), Mowday, Porter and Steers (1982), and Dalton and Tudor (1982). One positive outcome is the increase in upward mobility if turnover occurs "up the corporate ladder." This assumes that the relative capabilities

and potential of prospective replacements and the outgoing incumbent are not too drastic. Turnover may also allow marginal performers to move into a vacancy that is a better job match for the skills they possess. The second problem in viewing turnover as only negative is that it narrows the focus about appropriate managerial responses to how and if retention of desired personnel can be increased.

Muchinsky and Morrow (1980) divided voluntary turnover into three major classes of determinants, specifically:

- individual employee characteristics
- work-related factors
- economic variables

Table 2 breaks down these classes of determinants, as well as their relationship (positive or negative) to turnover. While Table 2 is not an exhaustive listing of relevant variables related to turnover, it does include the principal determinants of turnover used in the majority of analyses conducted to date. Each determinant consists of variables which have been proposed as probable antecedents of turnover, and have been established as correlates of turnover through empirical verification.

Muchinsky and Morrow (1980) found individual and work-related variables more predictive of turnover during periods of prosperous economic conditions than when the economy is strained. March and Simon (1958) found that under nearly all conditions the most accurate single predictor of turnover is the state of the economy. Muchinsky & Morrow (1980) caution that the use of economic factors in cross-sectional analytical models have weaknesses. In cross-sectional studies economic factors become fixed at the point in time the study was conducted, therefore, differences in individual variables are left to account for systemic variations in turnover. This has the conceptual effect of minimizing the impact of the economic variables over time. Since the economy and labor market are not static, longitudinal designs must be used to trace the true impact of economic variables.

Regarding economic factors, it has been suggested that high quit rates are a function of a secondary labor market, that is, an increase in the number of women, teens, and nonwhite workers entering the labor force when jobs are widely available. These same labor groupings frequently drop out of the labor market when more useful alternatives to paid employment appear (home service, attend educational institution, etc.). Thus it has been hypothesized that the existence of secondary labor market conditions increase voluntary turnover ( Muchinsky and Morrow, 1980).

TABLE 2  
DETERMINANTS OF TURNOVER AND SIGN OF EFFECT

1. Individual Factors

*Age (-)	*Intelligence (m)
*Length of service (-)	*Biodata (m)
*Vocational interest (m)	Family considerations (m)
*Family size (-, +)	Alternate income sources (+)
*Aptitude	*Personality (m)

2. Work related factors

*Recognition/Feedback (-)	Organization/job prestige
*Job autonomy responsibility (-)	*Pay (-)
*Supervisory characteristics (m)	*Preemployment intervention (-)
*Job satisfaction (-)	*Task repetitiveness (+)
*Organizational commitment (-)	Technology
*Seniority provisions (m)	*Work unit size (+)
*Role clarity (-)	Flexi-time (-)
*Person-job congruence (-)	*Organization size
*Occupation-role integration (-)	

3. Economic Opportunity factors

*State of national economy (GNP, unemployment) (+)
*State of local economy (+)
*Type of industry (-)
*State of industry (# job vacancies) (+)
Presence of secondary labor market (+)
Alternate institutional income sources (unemployment, welfare.) (+)

Note:

- (-) negative relationship to turnover
- (+) positive relationship to turnover
- (m) mixed relationship to turnover

While there are clearly relationships between employee turnover and economic conditions, most analysis has been focused on job turnover rates and aggregate levels of economic activity. As such, these studies have contributed little to understanding the individual turnover decision. (Mobley et al., 1979)

A more recent listing of the correlates of turnover as extracted from turnover literature was compiled by Cotton and Tuttle (1986). Three categories of determinants were developed, external factors, work-related factors, and personal characteristics. Table 3 displays this data. Cotton and Tuttle (1986) parallel Muchinsky and Morrow's findings that age, tenure, pay, job satisfaction, employment options and perceptions, and organizational commitment are stable, reliable correlates with turnover. The negative relationships of age and tenure (length of service) with turnover was verified in earlier studies (Porter and Steers, 1973; Porter et al., 1974; Price, 1977).



TABLE 3  
CORRELATES OF TURNOVER

1. External Factors

Employment perceptions  
Unemployment rate  
Accession rate  
Union presence

2. Work-related Factors

Pay  
Job performance  
Role clarity  
Task repetitiveness  
Overall job satisfaction  
Satisfaction with pay  
Satisfaction with supervision  
Satisfaction with work itself  
Satisfaction with co-workers  
Satisfaction with promotion opportunities  
Organizational commitment

3. Personal Factors

Age  
Tenure  
Gender  
Biodata  
Education  
Marital status  
Number of dependents  
Aptitude and ability  
Intelligence  
Behavioral intentions  
Met expectations

Suffice to say, correlates with turnover are plentiful and most have been empirically supported in numerous studies. This has posed a challenge to researchers to devote less time to reverifying correlates of turnover, and to more fully investigate turnover models and develop process-oriented theories of turnover (Cotton and Tuttle, 1986; Mowday, Koberg and McArthur, 1984; Mobley, Horner and Hollingsworth, 1978; Mobley, 1977; Rusbult and Farrell, 1983; Dalessio, Silverman and Schuck, 1986). Mobley (1982) cited the lack of research on turnover as a process, stating that one-time measures and subsequent bivariate correlational analyses are unable to detect changes in variables, an important consideration in judging the validity of turnover models.

Krackhardt and Porter (1986) investigated the relationship between turnover and communication networks. The traditional view of the turnover process assumes turnover occurs atomistically within the work group. Individual behavior is considered



a stochastic function determined by various personal and situational characteristics attributed to the person. Once these attributes are known, a regression model predicts an independent probability of an individual leaving. Krackhardt and Lyman assume people are not independent actors and affect each other by their own behavior. The degree to which they affect each other depends on their interrelationships, bonds created between members in a work group through role equivalence, and perceived role similarity as determined by informal communication patterns. Krackhardt and Lyman conclude that turnover occurs in clusters, and these clusters would be significantly related to the degree to which employees occupying similar informal roles as defined by perceived communication patterns. These informal clusters are conducive to allowing turnover to create more turnover (the "snowball effect"). From a managerial perspective, it becomes imperative that turnover rates be closely monitored and corrective action taken to prevent the costs of turnover from becoming excessive (Terborg and Lee, 1984). In an earlier study Price (1975) included participation in primary groups, communication, and centralization as three of four turnover determinants which were empirically supported (the fourth determinant being pay).

Investigations of organizational turnover have typically examined simple relationships between job attitudes, perceptions, and turnover (Dalessio et al., 1986). Job satisfaction is generally regarded as one of the more important antecedents of turnover, showing a consistently negative relationship to turnover with correlations ranging between .16 to .40 (Brayfield and Crockett, 1955; Locke, 1976; Porter and Steers, 1973; Martin and O'Laughlin, 1984; Mobley, 1977; Mobley et al., 1979; Price, 1977; Dalessio et al., 1984).

Lee and Wilbur (1985) found that job satisfaction increased with age of the individual. Younger employees were less satisfied with their jobs, especially with the intrinsic characteristics of the work, such as ability utilization, work challenge, creativity, independence, responsibility, and variety. Older workers found more satisfaction with extrinsic characteristics of their jobs, namely promotion opportunities, compensation, and work conditions. Salary, level of education, and job tenure did not alter the relationship of job satisfaction and age significantly.

Rusbult and Farrell (1983) concluded that greater job satisfaction resulted from high job rewards (personal and psychological) and low job costs (opportunity costs). Feelings of job reward were experienced almost immediately from the beginning of employment with an organization, and were strengthened through the use of realistic

job previews during the hiring process and the elimination of aversive elements of the job through periodic job redesign.

The use of measures of job satisfaction as the immediate precursor to actual turnover has been both accepted and supported, as well as reviewed, refined, and expanded. Job satisfaction is a global and multi-faceted measure (Ben-Porat, 1981). Many researchers have relied on a single item or selective index measure of job satisfaction in their studies. Defining overall job satisfaction as the sum of its many facets (discrete elements of which the job is composed) has been shown to neglect some major determinants of job satisfaction. Scarpello and Campbell (1983) supported the use of a single global rating (1 to 5 in their study) as the most inclusive measure of overall job satisfaction, as well as the most reliable measure. They conclude from their research that there is no empirical evidence that the single item measure of job satisfaction is unreliable or unstable.

One problem in the use of job satisfaction measures to identify problems that may be causing high turnover within an organization is contamination of the survey sample. Jackofsky (1984) substantiated that poor performers within an organization are generally the least satisfied with their job. Thus, using a single item measure of overall job satisfaction to survey an organization could potentially mask important relationships in the turnover process.

Another useful construct for predicting organizational turnover is organizational commitment, which concerns itself with the psychological attachments to the organization that makes voluntary separation difficult (Koch and Steers, 1978; Price and Mueller, 1981; Mobley et al., 1978; Mowday et al., 1979; Mitchell, 1981; Werbel and Gould, 1984; Williams and Hazen, 1986). Mowday, Steers and Porter (1979) define organizational commitment as an acceptance of the goals and values of the organization, a willingness to exert considerable effort in behalf of the organization, and a desire to maintain membership in the organization. It is the relationship between job satisfaction, organizational commitment, and turnover that has prompted much of the latest research for determining organizational turnover.

The major focus of commitment literature has been to identify antecedents of commitment from a variety of categories of variables. These categories have included personal and job characteristics, work experiences, organizational factors, and role-related factors. Through a process of evaluating costs and benefits, individual needs and desires are satisfied. The resulting affective state becomes associated with the

organization providing the job and its associated characteristics and environment. Commitment results from this association. (Williams and Hazen, 1986)

Rusbult and Farrell (1983) found greater job commitment resulting from high job rewards, low job costs, poor alternative employment quality, and existing large investment in the present job. Just prior to leaving a job in an organization, the job commitment of those who left was best predicted by a combination of these factors. They go on to point out that despite the significant advances in the research of employee commitment and turnover, and understanding these phenomena, much remains to be explained, sentiments previously aired by Mobley et al., (1979) and Mowday, Porter and Steers (1982).

Bateman and Strasser (1984) found organizational commitment to be an antecedent of job satisfaction rather than an outcome of it. Their study highlighted the complexity of the organizational commitment construct, and concluded that the organizational commitment was causal to job satisfaction. Williams and Hazen (1986) point out that recent models of organizational commitment (eg., Morris and Sherman, 1981; Steers, 1977; Stevens, Beyer and Trice, 1978) overlook the causal relationship between organizational commitment and job satisfaction. Because most models have included only one of these two variables, the causal relationship between the two is lost. The authors contend that there are relations between personal/organizational characteristics and job satisfaction, and a direct link between organizational commitment and job satisfaction. Williams & Hazen conclude that organizational commitment is an important determinant of turnover intentions, and that job satisfaction is a determinant of organizational commitment. This finding should not be surprising since one of the components of organizational commitment is desire to remain with the organization. Hence it is implied that personal and organizational variables such as age, expectations, and job characteristics influence job satisfaction directly, and organizational commitment indirectly through its link with satisfaction. Williams and Hazen (1986) establishes job satisfaction as an intervening variable to commitment with no direct impact on turnover.

Werbel and Gould (1985) point out that tenure in an organization moderates the relationship between commitment and turnover since commitment is less stable with recent hires than more tenured employees. Initial organizational commitment is based more on unrealistic expectations or post decisional justification than stable psychological attachments. A new employee may have incomplete information about



the organization's goals and values, as well as membership requirements, so that attachment to the organization takes time. Werbel and Gould conclude that more intensive study of the commitment process in recent hires is needed to expand knowledge of how the commitment process develops and at what point(s) it becomes a salient predictor of behavior and attitudes in organizations. Mitchell (1981) found that if tenure enters a regression equation predicting turnover, there is variance in the turnover process associated with whether or not the individual is new to the position.

### **C. TURNOVER PROCESS RESEARCH (MODELING)**

Research into the developing and testing of turnover models has lagged behind research into determining correlating variables of turnover (Arnold and Feldman, 1981). As mentioned earlier, Mobley et al.(1979), among others, cited the need for advancing this area of research.

One of the earliest models of the turnover process was provided by Rice, Hill and Trist, (1950). This model consisted of three phases in the turnover process: induction crisis, differential transit, and settled connection. Their theory addressed the turnover process in terms of psychological experiences and the choices individuals confront as they either continue with, or withdraw from an organization.

March and Simon (1958) developed a comprehensive turnover-participation model, including as key decision variables: perceived possibility of intraorganizational transfer, perceived desirability of movement, and perceived ease of movement. Price (1977) utilized a psychological process model similar to March and Simon, and extended the turnover process literature by introducing sociological variables describing organizational conditions such as centralization, co-worker integration, and formalization. This study, a follow-on to Price (1975) where pay, participation in primary groups, communication, and centralization were empirically supported as determinants of turnover, rectified the absence of both psychological and sociological determinants Price concluded were necessary in any turnover process model.

Porter and Steers (1973) developed a psychologically based turnover model premised on the theory of "met expectations" to explain the basis of employee turnover. As employee expectations of both the job and organization are met, the less likely they are to leave. Their model was devoid of structural and economic factors however, and has received little follow-on research.

Mobley (1977) was one of the earliest proponents of the existence of a withdrawal process as an intermediate linkage between job satisfaction and turnover. His first turnover process model consisted of the following ten factors:

- Evaluation of existing job
- Experience job satisfaction/dissatisfaction
- Think about quitting
- Evaluate expected utility of search and cost(s) of quitting
- Intentions to search for alternate employment
- Search for alternate employment
- Evaluate alternatives
- Comparison of alternatives and present job
- Intention to stay/leave
- Quit/stay

The strength of the Mobley approach of a withdrawal process linkage was that it provided several testable hypotheses and addressed in depth the interaction of psychological and economic variables. Structural variables were conspicuous by their absence however (Muchinsky and Morrow, 1980).

Mobley, Horner and Hollingsworth (1978) simplified the Mobley (1977) study, sequencing a revised set of factors in the turnover process as follows:

- Job satisfaction, individual characteristics, and the probability of finding alternate employment
- Thinking of quitting
- Intention to search
- Intention to leave
- Turnover

Figure 2.1 illustrates this model.

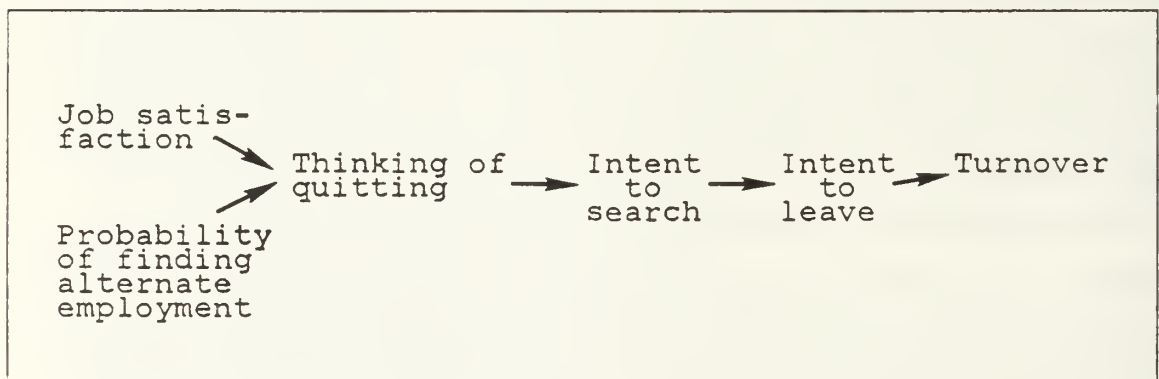


Figure 2.1 Mobley, et al., Model (1978).

The variables that link job attitudes (satisfaction and commitment) with turnover are most directly related to withdrawal cognitions, and only indirectly related to actual turnover.

Mobley, et al.(1978), attempted to investigate if the influence of job satisfaction was indirectly related to turnover, and was one of the first studies to formalize intention to quit as the immediate precursor to actual turnover. It also described intention to quit as a function of its preceeding factors. They go on to suggest that a fuller understanding of the psychology of the withdrawal process must consider cognitive and behavioral phenomena in addition to the affective experience of job satisfaction. As such, behavioral intentions soon became a focal point of research in the turnover process.

Researchers studying organizational commitment and turnover (e.g., Steers, 1977; Porter, Steers, Mowday and Boulian, 1974) typically included intentions in their operational definition of commitment, and have found commitment to be a stronger correlate of turnover than job satisfaction (Mobley, et al., 1978).

The Mobley, et al., (1978) model has served as the basis for critical research and validation, as well as a stepping stone for later models. Mowday, Koberg and McArthur (1984) cited as a weakness of the model the lack of cross-validation of the empirical results obtained by Mobley, et al., in their 1978 study. Evidence for the stability of this model was found to be greater within homogeneous samples than across samples that differed on important characteristics. The turnover decision process may differ for employees in different organizational and occupational settings (Mowday et al., 1984).

Dallessio, Silverman and Schuck (1986) tested the Mobley (1978) model using path analysis, and found multicollinearity problems in the model design. Multicollinearity is said to exist if variance of one independent variable in a regression equation is largely accounted for by a linear combination of the remaining variables. One consequence of multicollinearity may be highly unreliable path coefficients leading to specification errors in a path model. Dallessio, et al., could not empirically support the entire Mobley, et al., (1978) model. Support was found for the indirect effect of age on turnover through job satisfaction, the indirect effect of job satisfaction on turnover through withdrawal cognitions, and intent to quit as the immediate precursor to actual turnover. Support was found for the direct effect of withdrawal cognitions on intent to search, though there was no empirically supportable linkage of intent to search with



turnover. While empirical and theoretical linkages in the Mobley, et al., (1978) model have proven inconsistent, intent to quit consistently remained the strongest predictor of turnover. The results of the Dalessio, et al., (1986) study resulted in a revised turnover model as shown in Figure 2.2.

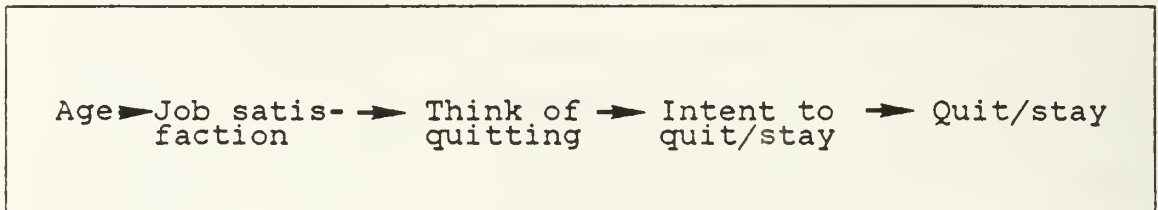


Figure 2.2 Dalessio, et al., Model (1986).

Miller, Katerburg and Hulin (1979) collapsed the Mobley, et al., (1978) model variable groupings into four groups, namely:

- Withdrawal behavior
- Withdrawal cognitions (think about quitting, job search, intent to quit)
- Career mobility (probability of finding alternate employment)
- Job attitudes (satisfaction, commitment)

They found that withdrawal cognitions explained the greatest amount of variation in turnover, while career mobility and job attitudes added little to explaining actual turnover. The influence of organizational commitment on turnover was indirect through its impact on withdrawal cognitions. Mowday, et al., (1979) found organizational commitment to be a direct predictor of turnover, but this finding is certainly not supported by Miller, et al., (1979), who claim their model is more strongly supported by virtue of double cross-validation of their results across two homogeneous samples used in their research. The Miller, et al., (1979) model is shown in Figure 2.3.

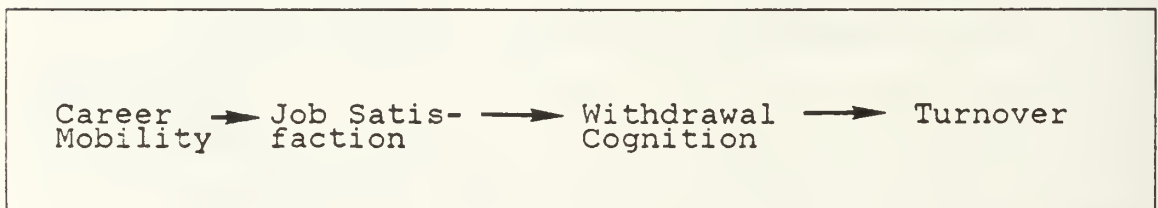


Figure 2.3 Miller, Katering, & Hulin Model (1979).

A follow up study to Mobley, et al., (1978) was proposed by Mobley, Griffeth, Hand and Meglino (1979), emphasizing the individual decision process. This model, shown in Figure 2.4, retained intention to quit as the immediate precursor to actual turnover. Intention to quit was determined by job satisfaction, attraction of and present utility of the current job, and attraction and expected utility of alternative jobs and roles. These determinants were in turn moderated by the centrality of work values or the nonwork consequences of quitting. Organizational, economic, personal, and occupational variables are included as antecedents of perception, values, and expectations of the individual (Mitchell, 1981). Individual perceptions and employment alternatives play an expanded role in this model. The Mobley, et al., (1979) has been considered the most highly integrated and comprehensive model of turnover in literature through the 1970's (Muchinsky and Morrow, 1980).

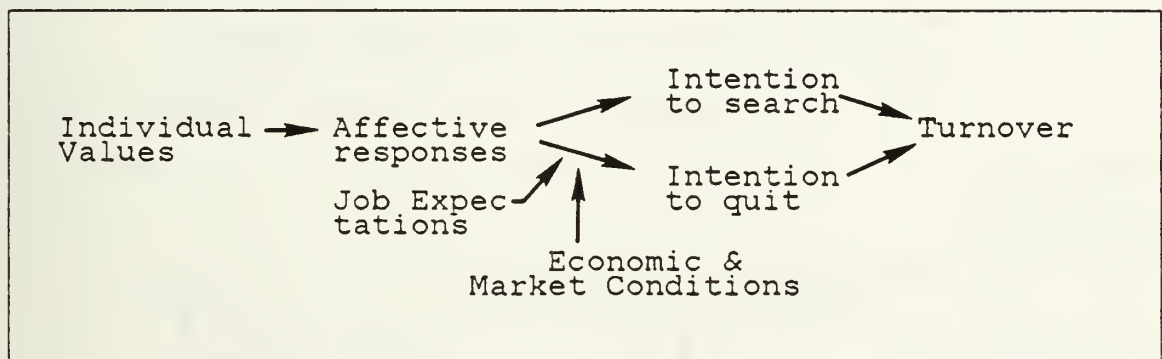


Figure 2.4 Mobley, et al., Model (1979).

Bluedorn (1979) also developed a generalized voluntary turnover model as shown in Figure 2.5. The exogenous organizational structure variables include pay and

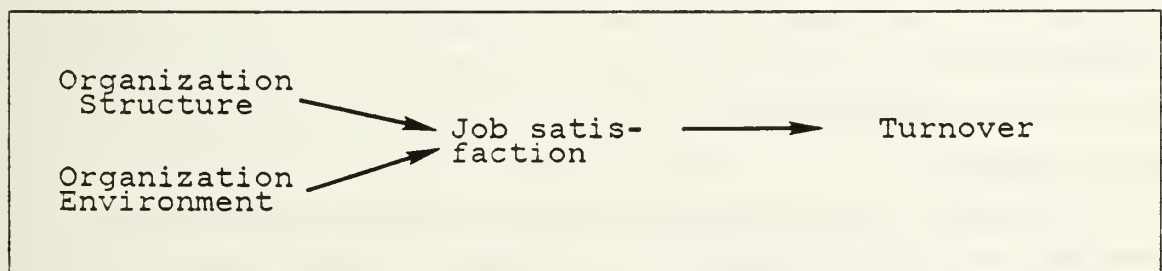


Figure 2.5 Bluedorn Model (1979).

organizational control (freedom and individual control of the worker) factors. The exogenous organizational environment variables are labeled environmental push and pull. Environmental push, the voluntariness of joining an organization, occurs at the time of entry and entails the negative sanctioning of an individual for failing to become a member of a specific organization. Environmental pull, comparison of various employment options, operates continually after an individual joins an organization, and refers to both the number of, and quality of higher unoccupied roles. Bluedorn hypothesized the greater the push and/or pull, the greater the propensity to leave the current job.

Steers and Mowday (1981) extended March and Simon (1958) with a 13- stage model of the process of voluntary employee turnover. Included as antecedents of turnover in their model were variables such as individual expectations, job experiences, affective responses to the job, nonwork-related influences, intent to stay, search for alternatives, and availability of alternatives. This model is shown in Figure 2.6.

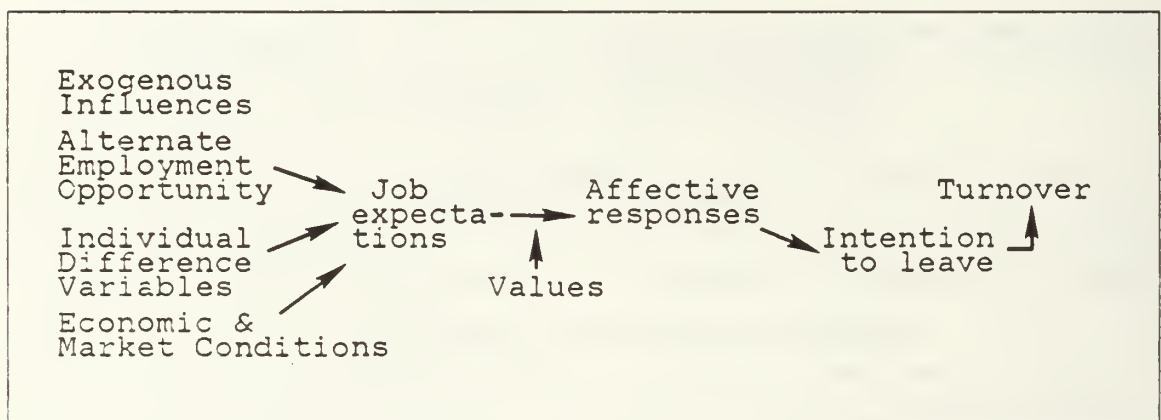


Figure 2.6 Steers & Mowday Model (1981).

Their model differs from Mobley, et al., (1979) in the positioning of individual values, job expectations, economic and market conditions, and affective responses variables. Steers and Mowday (1981) also exclude intent to search as one of the immediate precursors to turnover.

One final model to be discussed was developed by Arnold and Feldman (1982). Results of their research and data analyses lead to the model shown in Figure 2.7. They discovered that while some variables have a direct effect on turnover, other variables influence turnover through their impact on intent to turnover. Actual turnover was

more strongly related to intent to search, tenure, and perception of job security than intent to turnover (Muchinsky, 1983).

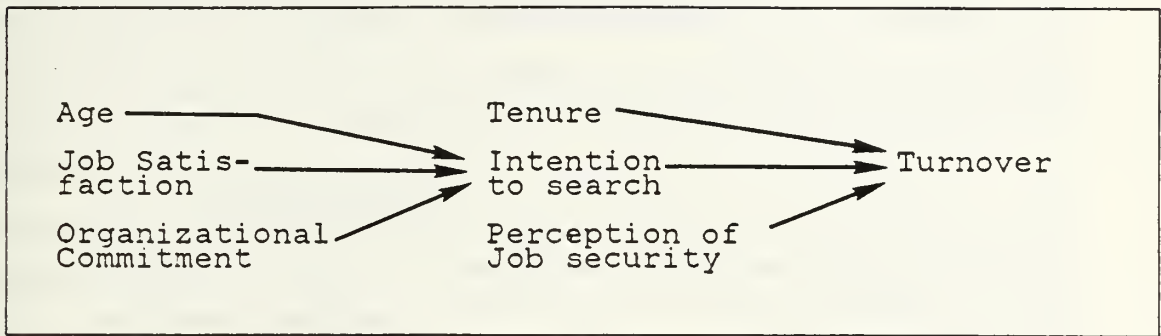


Figure 2.7 Arnold & Feldman Model (1982).

#### D. MILITARY RETENTION RESEARCH (ACTIVE FORCE)

A major difference between termination from military duty and civilian employment is that the law specifically grants civilians the right to terminate at any time for any reason. The law meanwhile specifically and severely limits the conditions under which military personnel can terminate their service with the armed forces (Stolzenberg and Winkler, 1983). As mentioned earlier, the focus in this research will be on voluntary terminations from the armed forces which includes voluntary departures during an enlistment term, or terminations through non-reenlistments.

Doering and Grissmer (1985) found that several recent studies (Gotz and McCall, 1980; Hiller, 1982; Warner, 1979; Warner and Goldberg, 1982, 1984) conclude that retention depends on compensation. They find that retention rates are sensitive both to the present and future expected value of compensation, that this sensitivity increases as individuals approach the 20-year retirement point, and that after 10 to 12 years of service, remaining in the military is almost always preferred to civilian employment.

Warner and Goldberg (1984) utilized the Annualized Cost of Leaving (ACOL) model for formulation of the reenlistment decision. The ACOL model is used by Navy manpower planners to predict retention rates for various grades and years of service. A choice based model, it is premised on an individual evaluating the utility associated with immediately leaving the service as opposed to reenlisting for additional periods of service. Utility is calculated from two components. The first component is the present value of the income stream of a selected outcome (reenlist or leave). The second



component is the present value of the monetary equivalents of the non-pecuniary aspects of the outcome. An individual would tend to reenlist for an additional period of service only if the ACOL exceeds the net taste for civilian life. Expected military and civilian pay and retirement benefits are the major variables used in this model. Warner and Goldberg concluded from their research on the ACOL model that variation in the ACOL explained much of the variation in the probability of reenlisting.

Other studies measuring the effect of income differentials (Enns, 1977; Hiller, 1982) on retention rates at the end of both the first and second term indicate a similar sensitivity to present and future expected values of income. Income differentials are caused by differences in pay over time, or due to differences in promotion, skills, or performance. Because nearly every form of pay differentials among individuals is nonrandom, ambiguous interpretation of the results generally occurs (Doering and Grissmer, 1985). They cite bonus payments to alleviate personnel shortages in the military as an example of nonrandom payments.

Doering and Grissmer (1985) further point out that besides the emphasis of research on compensation, additional behavioral variables such as sea-shore rotation and family separation for Navy enlisted personnel (Chow and Polich, 1980; Warner and Goldberg, 1982) as well as attitudinal variables (Chow and Polich, 1982) have been included to explain retention rates along with the standard pay and demographic variables. Doering and Grissmer cite the need for more experiments in the military to expedite progress in retention research. A limited number of experiments have been undertaken aimed at measuring the effects of educational benefits, (Fernandez, 1982; Haggstrom, 1981; Polich, Fernandez and Orvis, 1982) terms of service, (Haggstrom, 1981) and enlistment bonus payments (Polich, 1984).

Stolzenberg and Winkler (1983) report that Hiller (1982) examined the roles of compensation, promotion, location, and job satisfaction in explaining second-term reenlistment in the four services, finding compensation to be a good predictor of enlistees' stated reenlistment probabilities. Hiller also found that certain location and job satisfaction variables were also important, and that the single best overall predictor of reenlistment intentions was the enlistees' expectation of promotion to the next higher grade. This measure reflects compensation somewhat, but also encompasses such nonpecuniary factors as career success and nonpay benefits of promotion to the next higher level. Stolzenberg & Winkler (1983) conclude that compensation is an important determinant of voluntary termination, and that research has consistently

failed to model the relationships among different aspects of satisfaction with military service, including pay. Consequently, it is difficult to assess the total effect of compensation on the termination decision or to know if dissatisfaction with nonpecuniary factors fosters dissatisfaction with remuneration.

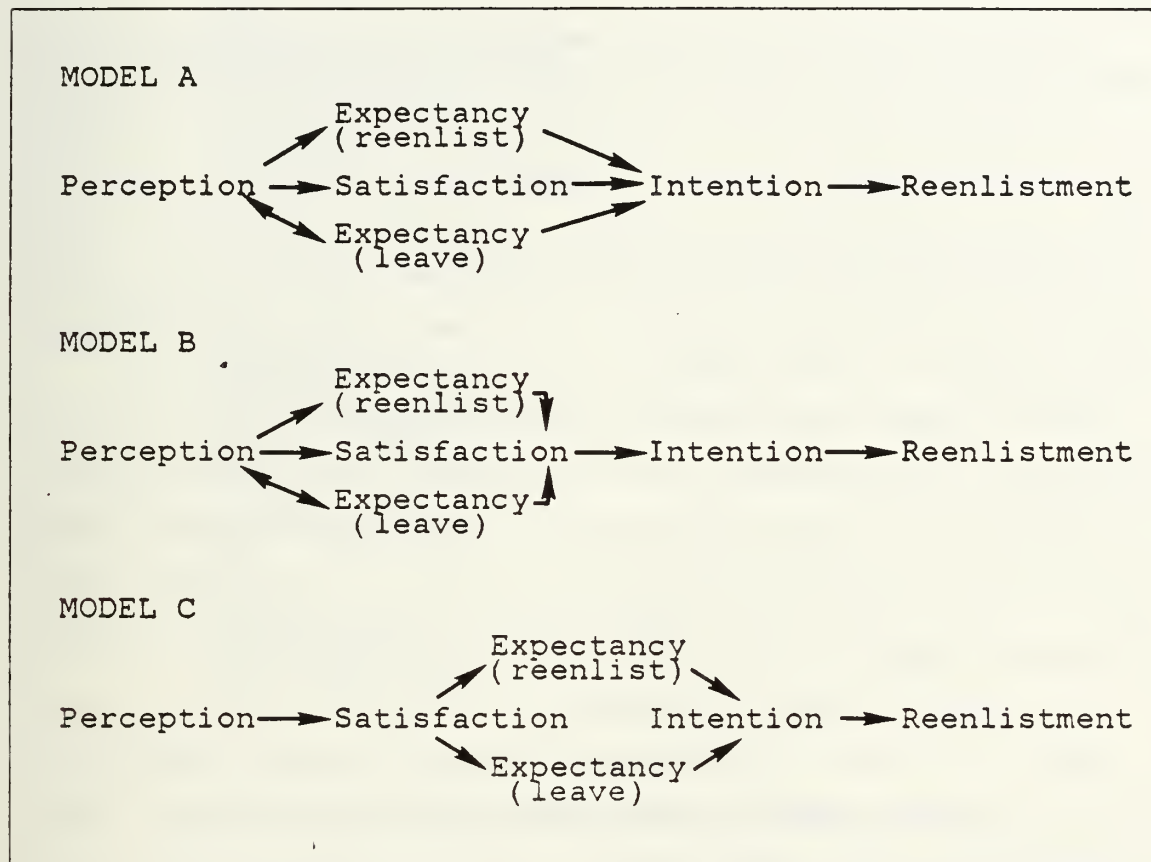


Figure 2.8 Motowidlo & Lawton Models (1984).

Motowidlo and Lawton (1984) tested three alternative models of causal relationships between satisfaction, expectancy about consequences of staying, expectancy about consequences of quitting, and intention to stay (reenlist) or quit for a sample of first term-Army soldiers. The three models are shown in Figure 2.8.

Model A replicates Mobley, et al., (1979). Motowidlo and Lawton found that neither model A nor B were consistent with the correlation patterns observed between perception of favorable Army attributes, satisfaction with Army life, expectancy about favorable consequences of leaving, intention to reenlist or leave, and actual reenlistment. Model C could not be completely ruled out due to the lack of a strong



empirical basis. They concluded that if model C is correct, management strategies should be focused directly on the job satisfaction. Turnover may be managed more effectively by improving job conditions, supervisory practices, pay policies, and other organizational features to keep the feeling of dissatisfaction from surfacing in the first place.

Fredland and Little (1983) found job satisfaction was lower for the military than civilians, and that specific elements of satisfaction, rather than personal characteristics of the individual, account for most of this difference. Reasons cited are military rotation policies, imperfect carryover of acquired military training and skills to the civilian sector, perceptions of organizational instability, and misinformation as to the nature of military jobs and placement in those jobs (poor job-match). Similarly they found that race, marital status, education, tenure, hours worked, and labor market experience appear to have little influence on job satisfaction in the military.

Balis and Hager (1983) found that individuals induced to reenlist at the first decision point by a bonus payment, but who would have reenlisted without the bonus, had a negative impact on second term reenlistment rates. This effect was found to hold for all three services examined, namely the Army, Air Force, and Marine Corps. Goldberg (1981) estimated a similar lagged bonus effect for the Navy to be negative and significant as well.

Hand, Griffeth and Mobley (1977) found that incentives, organization practices and climate, job content and satisfaction, intentions, expectations, demographic, psychological, aptitude, and performance variables, explain a small percent of variance in the dependent variable (turnover related). Table 4 displays a listing of variables found to be statistically significant in explaining actual and intended reenlistment, and was compiled from research conducted primarily between 1973 to 1977. While dated, these variables remain relevant as they continue to appear in more recent research of the military reenlistment problem. Carlisle (1975) and Glickman, et al., (1973) found that pay and/or fringe benefits had little effect on the decision to reenlist, but did effect the decision not to reenlist. Schneider (1973) also found that pay accounted for a very small proportion of the variance in the reenlistment decision for Navy personnel (less than 8 percent).

TABLE 4  
REENLISTMENT RELATED VARIABLES

1. Economic and Incentive variables related to actual reenlistments

- Reenlistment bonuses
- Age
- Race
- Education
- Estimated civilian earnings
- AFQT scores
- Pay
- Fringe benefits
- Occupational groups
- Dependents
- Potential for facing combat
- Reservation wage

2. Economic and Incentive variables related to intended reenlistment

- Pay
- Job security
- Proficiency pay
- Overall job satisfaction
- Career satisfaction
- Educational benefits
- Promotion opportunities
- Tenure
- Training opportunities
- Family separation
- Race
- Age
- Geographic location
- Medical benefits
- Nonpecuniary elements (e.g., patriotism, teamwork, etc.)
- Travel opportunities

## E. MILITARY RETENTION RESEARCH (RESERVE FORCE)

The review here concentrates on research of prior service individuals joining the Reserves as opposed to non-prior service individuals, although few studies are solely dedicated to only one of these two classes. It will also address turnover behavior in the Selected Reserves (SELRES) and National Guard.

Merritt (1982) found that retirement benefits are substantially more important than current pay levels for enlisted SELRES in the Navy. Pay was, however, found to be the major determinant in the initial enlistment decision. Family, civilian employer, military peers, and friends were found to be the strongest determinants of participation in the SELRES. Job satisfaction was found to be weakly related to participation, slightly more important in explaining withdrawal behavior.

Hom, Katerberg and Hulin (1978) tested three approaches to the prediction of turnover of National Guardsmen. They found that three of five aspects of job

satisfaction (work, pay, and supervision) were significantly correlated with reenlistment. When organizational satisfaction was added to the regression equation, it improved the prediction of reenlistment significantly (from  $R = .49$  to  $R = .55$ ). Organizational commitment also predicted reenlistment intention and behavior, correlating .68 with the intention, and .58 with the actual reenlistment decision. They also found that organizational commitment was a superior predictor of these criteria than a linear combination of job satisfaction measures. Finally, Hom, et al., found that intention to reenlist was highly related to actual reenlistment ( $r = .67$ ), and correctly classified 80 percent of the cases.

Brinkerhoff and Grissmer (1986) cite pay, the extent of moonlighting, unemployment, enlistment and continuation bonuses, educational tuition grants, training, and general taste for the military as important determinants of affiliation factors within the Reserves in an all-volunteer environment. The quality and demographic composition of SELRES personnel is roughly comparable to the active force, add, like the active force, differ from their draft-motivated counterparts in having a lower educational achievement and mental category level, and having a higher percentage of minorities and women. The average reservist has more total combined years of service since the volunteers have brought overall lower turnover levels and a more efficient balance of more prior-service and less nonprior-service manpower utilization.

Rostker and Shishko (1973) developed a theory of moonlighting, or secondary labor market participation, to explain the behavior of Air Force Reservists. The theory identified several important economic variables in a civilian moonlighting decision, including primary job hourly wage, primary job hours, and secondary job hourly wages. This moonlighting hypothesis was tested in 1978, during a downturn in Reserve accessions. Grissmer, Burright, Doering and Sachar (1982) and Grissmer, Doering and Sachar (1982) report that expected results of offering reenlistment bonuses to Army Reservists and National Guardsmen would increase reenlistment rates by 30 to 40 percent. The result was only a five percent increase, much smaller than anticipated. This supported the hypothesis that reservists did not behave like civilian moonlighters, in contrast to Rostker and Shishko (1973). Grissmer, et al., conclude that the reserve job seems to be somewhere between a kind of "voluntary" participation and the typical monetary-induced moonlighter.

Amey, Fechter, Huck and Midlam (1976) constructed a reserve supply model using a simple theory based on elements of existing theories of military occupational choice and secondary labor market participation. Fechter concludes that most analysts agree on a specification containing the following:

$$A = f(M, C, U, P, D, X)$$

where: A is accessions

M is reservist pay

C is construct of primary civilian wage and secondary civilian wage

U is unemployment rate

P is size of eligible population

D is draft pressure

X is any other variable (recruiting effort, seasonal dummies, time trends, etc.)

Draft pressure (D) is effectively dropped during the all-volunteer era.

McNaught (1981) tested the above model and found that for nonprior service accessions unemployment rate was the most significant variable. For prior service accessions unemployment rate was not significant overall while primary wage was. McNaught attributes the lack of significance of the unemployment variable for prior service accessions to their greater labor market experience and larger stocks of human capital.

Burright, Grissmer and Doering (1982) list five aspects of Reserve participation that set it apart from other second jobs and voluntary activities, briefly:

- Periodic full-time requirement of Reserve duty often conflicts with primary job
- Legally committed to at least one year up to six years of service
- Reserve participation provides unique fringe benefits
- Nonpecuniary rewards (patriotism, comraderie)
- Inflexible Reserve schedule

Unique fringe benefits include items such as insurance, education benefits, tax benefits, retirement benefits, etc.

Summarizing, most turnover research has concentrated on identifying and understanding correlates of turnover. More recent research has postulated and attempted to empirically support turnover processes, developing models derived from hypothesized linkages between factors of job satisfaction, organizational commitment, withdrawal cognitions, and their correlates. Very little research has been conducted to identify factors or models explaining the individual turnover decision process. This is due mainly to the reliance upon aggregate data sources, in general. The positioning of factors of intent (search, quit, stay, withdraw, etc.) as precursors to the actual turnover act is generally accepted and supported. Determinants of turnover for the civilian



sector, as examined above, have proven applicable to the military as well. Civilian turnover models constructed from various hypothesized turnover processes have not, in general, been empirically supported when applied in military studies.

The model hypothesized in this thesis applies determinants of turnover empirically supported in both civilian and military studies. Changes in the relative importance and contribution of variables in the reenlistment model vis-a-vis the reserve participation model will aid in understanding how factors of job satisfaction, organizational commitment and withdrawal cognitions, affect full-time and part-time affiliation intentions of a selected military cohort.



### III. RESEARCH OBJECTIVES AND METHODOLOGY

#### A. RESEARCH OBJECTIVES

The major objective of this study is to integrate hypotheses and research methods from civilian labor force studies with existing military research findings on turnover, and develop and test a model which can be used to explain affiliation intentions of first-term enlisted servicemembers. Major questions of interest include:

- What are the significant factors which affect a servicemember's decision to reenlist, leave the service and join a Reserve/National Guard unit, or to leave with no further military affiliation (turnover)?
- How applicable are studies conducted in the fields of job satisfaction and turnover to the reenlistment/leave decision? to the reserve/no reserve decision?
- What role does organizational commitment play in the military affiliation decision?
- What are the relative effects of economic, demographic, experience, attitudinal, and alternative employment factors have, if any, on the affiliation decision?

In order to keep the samples as homogeneous as possible, only first-term enlisted servicemembers with one year or less remaining on their initial contract were included. The samples were further stratified by including only servicemembers in paygrades E1 through E6, and between the ages of 18 to 30. Thus this sample of military first-termers can be considered representative of the services' total first-term population in both a branch specific as well as inter-service sense. This assumption of representativeness allows for the application of inferential statistical analysis for the purpose of policy decision-making. Each branch of service will be analyzed separately to provide a baseline of significant factors leading to the affiliation decision within each branch of service. The investigation will be conducted in two sequences that will look at three discrete affiliation choices, those being: (1) reenlist, (2) leave active duty and join the Reserves/Guard, or (3) leave active duty with no further military affiliation.

#### B. DATA BASE

The data base used in this study was generated from the Defense Manpower Data Center *1985 Survey of Officer and Enlisted Personnel* in the Department of Defense. The survey was sponsored by the Office of the Assistant Secretary of Defense (Force Management and Personnel) and conducted for the provision and systematic

examination of policy sensitive information about the military life cycle. The military life cycle includes both active and reserve force enlistment decisions, career orientations, responses to policies that affect military members and their households, and decisions to leave the military. The Users Manual and Codebook (Doering, et al., 1986) provided documentation for the data base.

The survey was fielded in January 1985 to a worldwide sample of approximately 132,000 active-duty military members in all four services, stationed both in the United States (CONUS) and overseas on 30 September 1984. Officers, females, and Marine Corps personnel were sampled at a higher rate to facilitate more detailed analyses of these groups. Each servicemember sampled had to have completed a minimum of four months or more of active duty to participate in the survey. Most of the questionnaires were completed in March 1985, meaning that respondents in the member survey were those that, at the time of survey administration, had completed 10 or more months of service. Data collection was completed in June 1985 and 70,025 usable enlisted member questionnaires (70.1 percent) were returned.

Three questionnaire forms were used in the data collection, one each for officers, enlisted, and spouses. The nine subject areas of the enlisted questionnaire which, incidentally, were virtually the same for officers, are described in Table 5. The basic design of the survey sample (stratification and selection) as well as the structure of the administered enlisted questionnaire permits data from this 1985 Member Survey to be contrasted with the Rand 1978 DoD Survey in several areas of personnel management.

For the purpose of retention analysis, however, the 1985 DoD Survey does suffer from the lack of questions regarding respondents' comparison levels of job attributes between military and perceived civilian employment as were available in the 1978 Rand DoD Survey. These missing questions relate to job conditions such as pay, medical benefits, retirement benefits, quality of supervision, quality of co-workers, and level of independence. Stolzenberg and Winkler (1983) among others have very persuasively argued for the need to use information on the satisfaction of military personnel with military work, life, and pay *relative* to the satisfaction on these dimensions that they believe would be available to them as civilians. Unfortunately, the current 1985 Survey asked questions on satisfaction that were not framed in a comparative mode but in an absolute mode.

TABLE 5  
NINE MAJOR SUBJECT AREAS OF THE 1985 DOD MEMBER SURVEY

*Military Information*-- Service, paygrade, military occupation, term of enlistment.

*Present and Past Locations*-- Length of stay, expected stay, problems at present location and in moving to the location.

*Reenlistment and Career Intentions*-- Probed respondent's future orientation by asking expected years of service, expected paygrade, probable behavior under different management options.

*Individual and Family Characteristics*-- Focused on basic demographic facts such as age, sex, marital status, number and ages of dependents.

*Dependents*-- Focused on basic demographic facts such as age, number, sex, physical and/or mental handicaps.

*Military Compensation, Benefits, and Programs*-- Requested valuation of military medical services, commissary and exchange privileges, family programs, base pay, allowances for quarters and subsistence, perceived tax advantages.

*Civilian Labor Force Experience*-- Focused on the household's civilian work experiences.

*Family Resources*-- Used to determine level of household debts and non-wage or salary sources of income.

*Military Life*-- Queried about attitudes to various aspects of military life, including compensation, interpersonal environment, and benefits.

## C. METHODOLOGY

A conceptual model of the process of military service affiliation used initially in this thesis is shown in Figure 3.1. This model is derived from the turnover literature and will be used to explain the military service affiliation intentions of first-term servicemembers approaching the reenlistment decision point. This model will be tested using the enlisted servicemember's responses to the *1985 DoD Survey of Officer and Enlisted Personnel* administered by the Defense Manpower Data Center. The candidate variables used to predict military affiliation intentions were grouped into the following categories:

- *Demographic* -- Biographical information allowing placement of respondent in various groups for analysis.
- *Tenure* -- Variables which provide information about the respondent's length of service and obligated service remaining.

- *Cognitive/Affective Orientation* -- Variables designed to assess the individual's perception of, and attachment to, their job and the Service.
- *Income and Economic Incentives* -- Variables used to measure the relative financial situation of the respondent with respect to other individuals and/or families in both the military and civilian sectors.
- *Perception of Employment Alternatives* -- The respondent's assessment of alternatives to current military affiliation and perceptions of military vs. civilian employment trade-offs.

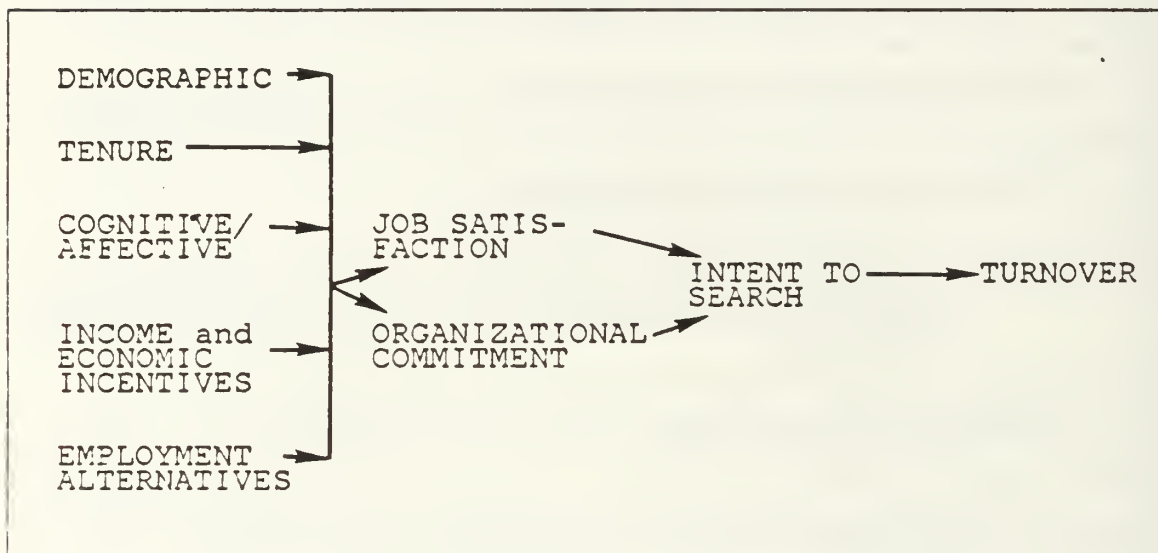


Figure 3.1 Hypothesized Turnover Model.

The construct measuring military affiliation intention (dependent variable) is the respondent's intentions regarding continued military affiliation derived from responses to two survey questions. The decision each respondent faces is whether to:

- reenlist, or
- leave the military and join the Reserves/National Guard, or
- leave the military and not join the Reserves/National Guard.

The affiliation construct will be investigated by examining results of two bivariate-choice based models for the reenlist and reserve decisions respectively. Each model will be analyzed individually as well as comparatively to assess the impact of candidate explanatory variables on continued military affiliation intentions.



#### D. STATISTICAL ANALYSIS

Probit analysis has commonly been used whenever individual, or micro, data is available and a model with a discrete dependent variable is being examined. Probit analysis and the newer maximum likelihood logistic analysis technique are very similar, and the analysis of choice is largely one of convenience and program availability (Hanushek and Jackson, 1977). Probit and logit analysis are capable of providing estimates of the conditional probability that an individual will reenlist or join the Reserves given the individual's attributes.

For the two binary-choice models (reenlistment or not) and (join Reserves or not), the probit model will be used to analyze these unique dichotomous choices. The probit model is associated with the cumulative normal probability function. The general equation is of the form

$$Z = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

Probit analysis, as does logistic analysis, shows how the probabilities of an event change with changes in the exogenous variables. The change in probabilities becomes progressively smaller as the probability approaches either zero or one. Probit analysis allows for obtaining estimates of the parameters " $\alpha$ " and " $\beta_i$ 's" as well as providing information about an unmeasured scale index  $Z$ . Probit assumes  $Z$  is a normally distributed random variable  $Z^*$ . Thus the probability of reenlisting or joining the Reserves becomes

$$P(Y = 1) = P(Z > Z^*)$$

while the probability of not reenlisting or not joining the Reserves becomes

$$P(Y = 0) = P(Z \leq Z^*).$$

#### E. EXPLANATORY VARIABLES

As discussed in the literature review, variables used in analysis of the turnover decision can be grouped into five general factor categories. These five categories are demographic, tenure, cognitive/affective orientation, income and economic incentives, and perception of employment alternatives. The 1985 DoD Survey contained 106 enlisted questions from which candidate explanatory variables were extracted for construction of the above five factor categories. Within the framework of the literature review and content of the 1985 DoD survey, the below factors and associated candidate variables will be investigated for their usefulness in explaining a servicemember's intended military affiliation. The number in parentheses following a term corresponds to the question number in the 1985 DoD Survey.



## 1. Demographic Variables

Table 6 provides a listing of candidate demographic variables and their value codings. These include gender, race, enlisted occupation, entry and current marital status, number of dependents, education, and age. Marital status and number of dependents were further combined by DMDC within the 1985 DoD survey into a single variable, household composition (HHC1). It is hypothesized that as a servicemember's family size increases, the less likely he (she) is to change careers.

TABLE 6  
CANDIDATE DEMOGRAPHIC VARIABLES

<i>VARIABLE</i>	<i>QUESTION</i>	<i>VALUE CODING</i>
Gender	E34	0 = Female 1 = Male
Race	RACE4	0 = Non-white 1 = White
Enlisted Occupation	EOCC2	dummy variables Technical Non-technical Medical/Dental Admin/Service/Supply
Marital Status	E47/E48	0 = not married 1 = married
Number of Dependents	E64	continuous
Current age	E35	continuous

For Race (Race4), the grouping "non-white" consists of "Black/Negro/Afro-American", "Spanish/Hispanic", and "Other". Crosstabulation of RACE4 with the reenlistment decision showed little dissimilarity in behavior between the racial groups. Crosstabulation of RACE4 and the reserve decision, however, showed that the "Black/Negro/Afro-American", "Spanish/Hispanic", and "Other" racial groupings displayed very similar behavior as opposed to "White". As such, and in view of the intended comparison of reenlistment and reserve affiliation models, the former three racial groupings have been combined owing to similar behavioral patterns

Enlisted occupation (EOCC2) was generated by DMDC from the 8503 Joint Uniform Military Pay System (JUMPS) file and survey question (E7). The numerous occupational specialties (the Army alone has in excess of 300 MOS codes) across the services were further reduced into four groupings as occupationally homogeneous as possible. The resulting occupational groupings reduces the estimable equations to a more manageable number.

For entry (E47) and current (E48) marital status, "Not married" is defined as "Single, never married", "Widowed", "Divorced", or "Separated". It is believed this latter category is expected to behave more similarly to not married respondents. "Married" is defined as "Married, first time", and "Remarried".

High school education (E42) or GED (E43) certificate were considered as candidate variables initially. However in excess of 96 percent of the respondents had either a high school diploma or GED certificate. Therefore these variables were subsequently not included due to lack of significant variation.

## **2. Tenure Variables**

Tenure, as discussed earlier, was consistently found by researchers to be negatively related to turnover. The 1985 DoD Survey contains only four tenure related variables, committed time remaining in service (ECTIME), paygrade (E5), total months of active duty (E6), and enlisted period serving (E8). Candidate variables used as measurements of tenure in this thesis include paygrade (E5) and total months of active duty (E6). It is hypothesized that the higher the paygrade, and completed length of service, the less likely a servicemember is to not reenlist or not join the Reserves.

This thesis only studies servicemembers in their first enlistment with 12 months or less obligated active service time remaining. Thus the variables remaining committed time (ECTIME) and enlisted period serving (E8) were utilized to stratify the subject groups from the total survey population, instead of being used as explanatory variables.

Total months of active duty (E6) is used as a separate variable in this study since tenure in an organization can be characterized as the interrelationship of the individual and the organization (organizational commitment), rather than being solely an individual demographic factor. Based on potential variation in initial tour lengths of from two to six years, or conversely 24 to 72 months, total months of active duty (E6) was included as a candidate tenure variable.

### 3. Cognitive/Affective Variables

Table 7 contains a listing of candidate cognitive/affective variables and their value codings. These variables are used to assess the servicemember's perception of, and feelings regarding, his job and his relationship with their respective branch of service. Factor analysis is utilized to examine a large number of candidate questions while developing a set of underlying factors (categories). The use of factor analysis allows for reducing the number of questions to a smaller set which relate to a specific underlying common factor. These underlying factors have been divided into four separate groupings, being; satisfaction with quality of life (QLS) measures of the respondent's military job; family related security factors(FRS), and perception of present and future pecuniary benefits (PPB and FPB). Satisfaction with promotion opportunities (E105k) is included based on Hiller (1982), where the single best overall predictor of reenlistment intentions was found to be the enlistee's expectation of promotion to the next pay grade.

TABLE 7  
COGNITIVE/AFFECTIVE VARIABLES

<i>VARIABLE</i>	<i>QUESTION</i>	<i>VALUE CODING</i>
Quality of Military Life (QLS)	construct E105A,B,C,J, L,N	discrete 1 = Very satisfied 5 = Very dissatisfied
Family Related Security (FRS)	construct E105F,M,P,Q E19A,C,E,J, N,M,O,P, E17B,C,D,I, J,L,N,O	discrete 1 = Very satisfied 5 = Very dissatisfied
Present Pecuniary Benefits (PPB)	construct E105E,H	discrete 1 = Very satisfied 5 = Very dissatisfied
Future Pecuniary Benefits (FPB)	construct E104B,C	discrete 1 = Very satisfied 5 = Very dissatisfied
Promotion Opportunity	E105K	discrete 1 = Very satisfied 5 = Very dissatisfied

Quality of life measures include autonomy, physical work environment, skill utilization and quality of relationships with peers, supervisors, and subordinates (Fletcher and Giesler, 1981). Quality of life measures were examined through respondent's answers to survey questions regarding:

- satisfaction with personal freedom in current job (E105A)
- satisfaction with current job (E105J)
- satisfaction with work conditions (E105N)
- satisfaction with on the job training (E105L)
- satisfaction with co-workers (E105C)
- satisfaction with friendships formed (E105B).

Responses to these particular questions were selected from a larger set of questions (23 total available) as a result of factor analysis. These six questions loaded heavily into one factor, termed (QLS), which implied a mutual association. This single index measure (QLS) was then formed by summing the products of a variables factor score multiplied by its individual value, that is

$$QLS = ((FSCORE \times E105A) + (FSCORE \times E105J) + \dots + (FSCORE \times E105B))$$

The Family related security (FRS) factor was derived by the same factor analysis procedure as discussed above for (QLS) by examining questions concerning:

- job security (E105M)
- satisfaction with family environment (E105F)
- satisfaction with present location (LOC)
- satisfaction with Medical (E105P) and Dental (E105Q) benefits
- satisfaction with the move to the new permanent location (PCS)

Satisfaction with present location (LOC) was obtained by factor analysis of questions (E19A/C/E/J/M/N/O/P) dealing principally with housing issues (availability and quality), as well as environment and general amenities afforded at the new location. Satisfaction with the move to the new location by virtue of permanent change of station (PCS) orders was obtained by factor analysis of questions (E17B/C/D/I/J/L/N/O) dealing with particulars of the move itself, such as sufficient lead time to prepare, ease of movement, availability and quality of schooling at new location, desirability of new station, level of temporary moving and household expenses, etc.



The perception of present and future pecuniary benefits (PPB and FPB respectively) were formed by factor analysis of four questions in the DoD survey. The variable present pecuniary benefits was formed through factor scores derived from analysis of questions concerning satisfaction with current pay and allowances (E105E) and satisfaction with retirement benefits under current military policies (E105H). Questions about military personnel in the future having as equitable retirement benefits as the respondent has now (E104B) and how well military pay and benefits are keeping up with inflation (E104C) were similarly combined through factor scores to form the future pecuniary benefits (FPB) variable.

#### 4. Income and Economic Incentives

Table 8 contains candidate income and economic incentive variables and their value codings, and include measures of total family income for 1984 (INCOME2), spouse employment, and outstanding debts.

TABLE 8  
INCOME AND ECONOMIC INCENTIVES

<i>VARIABLE</i>	<i>QUESTION</i>	<i>VALUE CODING</i>
Total Family Income, 1984	INCOME2	continuous
Number of Weeks Spouse Worked, 1984	E94	0 = Not working 1 = Working
Amount of Debt	E98	continuous

Total family income in 1984 (INCOME2) was created by DMDC in their 1985 DoD study. DMDC combined measurements of base pay, basic allowances for quarters and subsistence (BAQ/BAS), variable housing allowances (VHA), and charges for inadequate government quarters. This data was available through the Joint Uniform Military Payment System (JUMPS) master file. The pay and allowance totals were combined with reported spousal earnings activities (E88, E95, E97) for 1984, and provided a single measure for total family income. The income variable was further subdivided into grouped earnings cells for analysis.

The increased number of working wives indicates that the potential loss of this income source may have an impact on the decision to reenlist, should reenlistment



require a PCS move away from the job source. While spouse earnings is already reflected in INCOME2, spouse working activity was measured separately by a dichotomized variable. Question (E94) was divided into "non-working" and "working" groups, where those who worked 25 weeks or less in 1984 were characterized as "non-working" and those working 26 weeks or more were defined as "working". It is hypothesized that wives who work for at least half of the year have greater attachment to the labor market, and would have a different impact on a reenlistment decision requiring a PCS move than spouses who work less. Additionally, a working spouse contributing a significant amount of income to the family may also cause the servicemember to look at the Reserves as a source of supplemental income until more suitable or desirable employment can be found, should the decision be made to leave active duty.

Finally the amount of outstanding debts (E98), excluding mortgage payments, was included. It is believed that with higher outstanding debts, at least two possibilities arise. One possibility is that the individual will be less likely to want to leave a source of continuous and steady income needed to liquidate these debts. A second possibility is that the higher the level of debt, the greater the need to move to a job with potentially higher wages and net income. Thus the level of debt may give some insight to the ultimate military affiliation decision of individuals.

### **5. Perceived Employment Alternatives**

The various turnover models discussed in the literature review strongly suggests that thoughts of quitting, intentions to search for employment alternatives, and intentions to quit, are all predicated on the availability, or perceived availability, of alternatives to military service. Measures for perceived employment alternatives are in the 1985 DoD Survey and include the number of civilian job offers, actual search for civilian job opportunities, and the likelihood of finding a good civilian job.

Intention to quit in the military (in a purely voluntary sense) is essentially a measure of an individual's likelihood of not reenlisting upon completion of the current enlistment contract. Intention to quit has been shown to be a precursor to actual turnover behavior in civilian studies as discussed earlier in the Literature Review. However, intention to quit is more appropriately an alternate measure of reenlistment/reserve intentions within this military study as the servicemember arrives at this decision point. Thus intention to quit and the receipt of civilian job offers are not included as separate candidate explanatory variables for predicting military

affiliation intentions. The servicemembers evaluation of civilian employability was measured by survey question (E92), which asked the respondent to assess the likelihood of finding a good civilian job if they were to leave the service now.

#### **F. MILITARY AFFILIATION (DEPENDENT VARIABLE)**

As alluded to previously, the three decisions facing a servicemember in this study are:

- reenlist
- leave and join the Reserves/National Guard, or
- leave and do not join the Reserves/National Guard.

The 1985 DoD survey does not provide longitudinal data of the actual decisions of the respondents. In other words it is not known for certain which option an individual actually decided to follow. For this study the likelihood of final decisions by the respondents are inferred from their stated intentions, as intent to commit turnover has been widely accepted as the immediate precursor to actual turnover. There is ample precedent for the use of intent to commit turnover, as Bluedorn (1976) cited no fewer than 16 major military studies alone which utilized the turnover intentions variable in the absence of actual turnover data.

The likelihood of reenlistment was derived from Question ID: E30 where the respondent was asked:

How likely are you to reenlist at the end of your current term of service?

Assume that all special pays which you currently receive are still available. Mark one.

Fourteen responses were possible:

- Does not apply, I plan to retire
- Does not apply, I plan to leave the service
- (0 in 10) No chance
- (1 in 10) Very slight possibility
- (2 in 10) Slight possibility
- (3 in 10) Some possibility
- (4 in 10) Fair possibility
- (5 in 10) Fairly good possibility
- (6 in 10) Good possibility
- (7 in 10) Probable
- (8 in 10) Very Probable

- (9 in 10) Almost sure
- (10 in 10) Certain
- Don't know

The likelihood of joining the Reserves/National Guard was derived principally from Question ID: E28 where the respondent was asked:

When you finally leave the military, do you plan to join a National Guard or Reserve unit? Mark one.

Six responses were possible:

- Definitely yes
- Probably yes
- Don't know/Not sure
- Probably no
- Definitely no
- Not eligible

The three military affiliation decision variables were formed as follows:

- Reenlistees (REEN) were defined as those who responded "probable", "very probable", "almost sure", or "certain". Those defined as not reenlisting (NOREEN) were defined as respondents who answered "I plan to leave the service", "no chance", "very slight possibility", or "slight possibility" to the likelihood of reenlistment question.
- Candidate respondents for inclusion in the Reservist/Guardsmen data pool were defined as those individuals not classified as Reenlistees. Thus those servicemen who answered question (E30) as "good possibility" or lower, through "I plan to leave the service", were considered as not in the service and potential Reservists.
- Reservists/Guardsmen (RSVST) were then defined as those who responded "definitely yes" or "probably yes" to question (E28) and were maintained in the reservist data group. Civilians (CIVS), individuals who were discontinuing military affiliation, were defined as those who responded "probably no" or "definitely no" to question (E28).

Table 9 provides a statistical summary of reenlistment intentions of the final survey sample by branch of service and gender. Of 1790 individuals in the final Navy sample, a total of 30.8 percent (552 of 1790) servicemembers responded "probable", "very probable", "almost sure", or "certain" to survey question E30, and are classified as "reenlistees". Of the 948 males in the Navy, 25 percent (237 of 948) were classified as "reenlistees" while 37.4 percent of the females (315 of 842) were similarly classified.

The total number of servicemembers in each remaining branch of service as well as the percentage of those classified as "reenlistees" were developed in the same manner as for the Navy sample discussed above.

TABLE 9  
LIKELIHOOD OF REENLISTMENT

Service	TOTAL		MALE		FEMALE	
	Sample Size	PCT Reenlist	Sample Size	PCT Reenlist	Sample Size	PCT Reenlist
Navy	1790	30.8	948	25.0	842	37.4
Army	1526	37.2	887	28.1	639	38.0
Air Force	1292	37.6	751	37.4	541	37.9
Marines	987	16.2	911	15.4	76	26.3
Total	5595	30.2	3497	25.9	2098	37.3

Table 10 provides a statistical summary of reserve affiliation intentions of the final survey sample, again by branch of service and gender. Similar to Table (9), the percentage of servicemembers classified as "reservist" has been computed for the total sample as well as by gender.

TABLE 10  
LIKELIHOOD OF JOINING RESERVES/NATIONAL GUARD

Service	TOTAL		MALE		FEMALE	
	Sample Size	PCT Joiners	Sample Size	PCT Joiners	Sample Size	PCT Joiners
Navy	1496	48.5	781	35.7	715	62.5
Army	1250	57.7	712	56.6	538	59.1
Air Force	1040	42.6	608	39.3	432	47.2
Marines	817	36.6	754	35.1	63	53.9
Total	4603	47.5	2855	41.5	1748	57.4

As can be seen in Tables 9 and 10, male servicemembers, in general, are less likely to reenlist or join the reserves than their female counterparts. To maintain the boundaries of this investigation within the time available constraints, only first-term



enlisted males are investigated in the remaining portions of this thesis. Analysis of female military affiliation intentions remains open for future investigation.

## **G. VARIABLE REDUCTION**

Previous research efforts into areas of turnover, organizational commitment, and military affiliation decisions have provided a broad spectrum of candidate variables to explain these behaviors. A most perplexing problem is the selection of a final set of independent variables to be employed in predicting likely individual behavior, and in particular, military affiliation intentions of first-term males for this thesis. Chapter II provided a lengthy list of widely used candidate variables, segregated into five separate categories: demographic, tenure, cognitive/affective orientation, income and economic incentives, and perception of employment alternatives. Neter, et al., (1985) point out that candidate independent variables should be screened out if they are not fundamental to the problem, are subject to large measurement errors, and/or effectively duplicate another independent variable in the list.

A regression model with a large number of independent variables can be complicated to interpret and is, generally, expensive to maintain. A smaller model is generally easier to analyze and understand as well as being less expensive to maintain. Additionally, a larger model has a greater opportunity of having many intercorrelated independent variables which detracts from the predictive power and descriptive capabilities of the model by decreasing the reliability of regression coefficients as unbiased estimates of population parameters (Neter, et al., 1985). The final subset of independent variables must be small enough to minimize maintenance costs, but large enough to provide adequate descriptive and predictive capabilities for the military affiliation intentions model.

Three methods have been employed to reduce the number of independent variables for the final military affiliation intentions models. The first method was the compilation of a matrix of simple bivariate correlations between the candidate variables themselves, as well as between the candidate variables and the dependent variables (E30) and (RSVST). Any two independent variables having a high simple correlation ( $r > .50$ ) became candidates for causing trouble in correctly estimating the final affiliation decision model. If a high simple correlation was detected between two variables, further investigation of those particular variables was conducted to ascertain if these variables were similar measures of a common independent variable, if they were not fundamental to the problem based on previous research, or could be combined into a single independent variable.



A second method employed was the use of probit analysis of the dependent variable within each of the five independent variable categories. This analysis provided initial insight as to which candidate variable(s) within each category was (were) statistically significant in estimating the probability of reenlisting or joining the reserves. The hypothesis here was that any variable not statistically significant based on individual variable coefficient 't-tests' was not likely to contribute significantly to estimating the probability of military affiliation when variables from all five categories were included. An insignificant 't-test' score was not automatic grounds for rejecting a variable, however. A low 't-test' score was subjectively weighed against findings in previous research as to the relevance of including such a variable based on the model specification. Thus, a variable with a low 't-test' score, but meeting the needs of the model specified, would still be included in the final estimation so as to not cause the remaining variables to overstate (or understate) their own impacts on the military affiliation decision.

The probit analysis allows a check of the sign(s) of the individual probit coefficients which provides insight as to potential multicollinearity problems. A coefficient sign which is contrary to the hypothesized relationship is a strong indicator of variable multicollinearity which must be dealt with in accurately specifying a final model.

A third method used involved the logistic transformation of the dependent variable for use in an ordinary least squares linear regression. This method was only used on the reenlistment intentions variable (E30) to support findings of potential candidate variables for the final military affiliations intentions models. It also served to highlight or confirm the presence of multicollinearity among the candidate independent variables through interpretation of the expected sign (positive or negative) of the probit coefficients. Again, candidate variables which were not statistically significant in explaining the logarithmically transformed reenlistment intentions variable by virtue of coefficient 't-tests', ( $t > .10$ ), were subjectively considered in view of previous research efforts in military affiliation decisions in order to avoid model misspecification.

The combination of these three methods along with established findings in previous research provided relatively consistent and comparable results as to which variables were primary candidates for inclusion in the final military affiliation intention models.

## IV. ANALYSIS OF REENLISTMENT INTENTIONS

### A. MODEL ESTIMATION FOR REENLISTMENT INTENTIONS

A study of simple bivariate correlations of all of the initial candidate independent variables and the reenlistment/reserve dependent variables for each branch of service highlighted some potential multicollinearity problems. As expected, high simple correlations ( $r > .50$ ) were present within the following group of initial candidate explanatory variables:

- marital status (E48)
- number of children (CHILD)
- working spouse (E94)
- family related security (FRS)
- household composition (HHC1)

Some of these initial variables were deleted prior to estimating the preliminary reenlistment model. The HHC1 variable, by its construct, encompasses both marital status (E48) and number of children (CHILD), and had a generally stronger bivariate correlation with reenlistment intentions when measured across the four military services. HHC1 was divided into dependency groupings where unmarried servicemembers were coded as zero (0); married with no other dependents or unmarried with one dependent were coded as one (1); married with one other dependent or unmarried with two dependents were coded as two (2); and so on. Thus marital status and number of dependents is still interpretable through the single HHC1 variable without introducing probable multicollinearity by virtue of the relationship of marital status to number of children/other dependents. In view of the high bivariate correlation between marital status and number of children, as well as these variables' multicollinearity with several other candidate variables, (E48) and (CHILD) were dropped from the preliminary reenlistment model.

Both total family income (INCOME 2) and variable (E94), whether the service member has a working spouse or not, had very low bivariate correlations with the reenlistment intentions dependent variable (E30) and were not statistically significant in either the probit or ordinary least squares regression analysis. As such, they were also dropped from consideration for the reenlistment intentions models while another

variable, spouse earnings (E95) was substituted. It is believed that variable (E95), SPOUSEINC, captures the effects of both a working spouse plus the marginal increase to total family income attributed to a working spouse.

Family related security (FRS) was found to be somewhat highly correlated with household composition (HHC1), with simple correlations ranging from .48-.56. FRS does introduce effects attributed to factors measured and interpreted differently from the number of dependents of the serviceman. Despite the potential for multicollinearity between these two variables, both will be included in the final model and carefully analyzed for any "tell-tale" signs of severe multicollinearity (e.g., widely fluctuating coefficients, sign changes, etc.).

The candidate variables (E91), servicemember looked for civilian job, and (E90), servicemember received a civilian job offer, were both deleted from the final model. It is believed that job search will result in either a job offer or no job offer, and job search has been shown in various studies to be predicated largely on a servicemember's satisfaction with his military affiliation. Thus the factors determining reenlistment intentions also largely determine whether or not an individual will seek alternate employment. As such, variable (E91) is an alternative measure of reenlistment intentions as well as being, within itself, a precursor to actual turnover, pending the results of his search, variable (E90). Variable (E92) the probability of finding a good job outside of the military is a more appropriate candidate variable as it measures the servicemember's perceptions of alternate employment without having made the decision to actually look for civilian work.

Due to the high bivariate relationship between paygrade (E5) and length of service (E6), these variables were combined, dividing paygrade by length of service ( $E5/E6$ ), to form an advancement pace variable (ADV RATE) for the final model. By design (ADV RATE) should improve upon the use of either the paygrade variable (E5) or length of service variable (E6) separately in explaining reenlistment intentions behavior across the four branches of service. ADV RATE provides a measure of how rapidly individuals advance within each branch of service regardless of length of initial enlistment contract, which may span from two to six years and possibly limit the attainment of any specific paygrade. Once an individual reaches a certain paygrade, the amount of time it takes a serviceman to reach, or expect to reach the next higher paygrade is hypothesized to weigh more heavily on the reenlistment decision than present paygrade. An individual who quickly advances in paygrade will more likely

reenlist than an individual with a slower pace. By combining these two highly correlated variables in the final reenlistment intentions model, any problem with potential multicollinearity is reduced.

Table 11 shows results of probit analyses conducted on the five revised independent variable categories within each branch of service. The results of these probit analyses were utilized in conjunction with bivariate correlation matrices (not shown) in paring down the number of candidate variables for inclusion in the final reenlistment intentions models. Table 11 highlights additional areas of potential multicollinearity between candidate variables within their respective categories. Within the cognitive/affective variables, (FRS) was found to be the primary cause of the unexpected coefficient signs in the (PPB), (FPB), and (E105K) variables. When (FRS) was dropped from the service specific probit regressions, in all but one instance the previously positive coefficients become negative, their expected relationship with reenlistment intentions. Further investigation of the (FRS) variable, principally by factor analysis, led to restructuring the construct of this variable by removing the present location (LOC) variable from the composite (FRS) factor and using (LOC) as an independent variable. Subsequent probit regressions resulted in (FRS) coefficients having the hypothesized negative relationship to reenlistment intentions. All statistically significant variables ( $t \leq .10$ ) had the expected negative coefficient signs. In each service (LOC) was found not to be statistically significant in explaining/predicting reenlistment intentions and was suspected to intensify multicollinearity problems due to high bivariate correlations with other affective/cognitive variables. Hence, (LOC) was not included in the final models.

The age (E35) variable for the Air Force had an unexpected negative probit coefficient, giving rise to suspected multicollinearity. In view of age (E35) having a negative bivariate correlation with reenlistment intentions (E30), and not being statistically different at the  $t \leq .10$  level, the negative probit coefficient for age (E35) in the Air Force sample is deemed a logical result of the data sample itself rather than a matter of multicollinearity.

## **B. RESULTS OF REENLISTMENT DECISIONS**

The results of probit analyses of the final reenlistment intentions models for each branch of service are shown in Table 12. The summation of the products of the probit coefficients multiplied by their respective variable values will be utilized in determining the probability of a serviceman reenlisting in the armed forces given his characteristics.



TABLE 11  
PRELIMINARY REENLISTMENT MODEL

VARIABLES	Probit Coefficients			
			AIR	
Demographic	ARMY	NAVY	FORCE	USMC
RACE4( - )	-.505***	-.403***	-.462***	-.506***
HHC1	.045***	.064***	.046***	.040***
AGE	.049	.029	-.022	.042*
NONTECH	-.045*	-.074	.032	.203*
SUPADMIN	.213*	.145	.023	.119
MEDDEN	.319	.668	.316	na
Cognitive/ Affective				
QLS( - )	-.489***	-.526***	-.374***	-.425***
FRS( - )	.017***	.024***	.018***	.005
PPB( - )	-.657	-1.55	.139	-1.08*
FPB( - )	-.153***	.002	.013	-.087*
PROMOPP( - )	-.013	.041***	-.150***	-.009
Income				
SPOUSEINC	-.00001	.00003***	-.00001	.00002**
DEBT	.00006***	.00004***	.00004***	.00004***
Employment Alternatives				
SEARCH( - )	-.165*	-.460***	-.484***	-.417***
OFFERS( - )	-.081	-.003	-.239**	-.063
FINDING( - )	-.676***	-.811***	-.685***	-.407***
Tenure				
PAYGRADE	.391***	.200***	.214**	.186***
LOS	.083*	-.058*	.022	-.003
No. Cases	727	779	672	784

( - ) = hypothesized negative relationship

\*\*\* = t significance level  $\leq .01$

\*\* = t significance level  $\leq .05$

\* = t significance level  $\leq .10$



The probability of an individual reenlisting in the Army, for example, is derived from the equation

$$\begin{aligned} Z^* = & 1.695 - .449\text{RACE4} + .182\text{HHC1} + .003\text{E35} + .103\text{NONTECH} \\ & + .230\text{SUPADMIN} + .34\text{MEDDEN} - .551\text{QLS} - .024\text{FRS} - .889\text{PPB} \\ & - .172\text{FPB} - .00002\text{E105K} - .00002\text{E95} + .00005\text{DEBT} \\ & - .625\text{E92} + .079\text{Advrate} + .15\text{E6} \end{aligned}$$

Similar equations can be constructed for the other three services using the probit coefficients listed under each branch of service.

The value which results from this equation, after specific values of the explanatory variables have been entered, is the index value  $Z^*$  which is assumed to be a normally distributed random variable. The  $Z^*$  is converted to the probability of reenlisting, given the characteristics entered, through the use of the cumulative normal distribution tables. The smaller the  $Z^*$ , the smaller the probability of reenlisting. As an example, if  $Z^* = -1$ , the probability of reenlisting is equal to .159. At  $Z^* = 0$ , the probability of reenlisting is equal to .50, and at  $Z^* = 1$ , the probability of reenlisting equals .841, and so on.

From Table 12 it can be seen that for each branch of service the highest probability for reenlistment will be for a serviceman with the following characteristics:

- non-white (black, hispanic, other)
- having several dependents (spouse, and/or children)
- 30 years old (18 for the Air Force)
- in ratings other than technical (except for supply and administrative personnel in the Air Force)
- more satisfied with job pecuniary and non-pecuniary factors
- more optimistic about promotion opportunities
- having some level of outstanding debts
- less likely to find suitable civilian employment
- having advanced at a quicker pace (except Air Force)
- have more time in service

Conversely, the smallest probability for reenlistment will be for a serviceman with the following characteristics:

- white
- having few or zero dependents
- 18 years old (30 for the Air Force)
- in a technical rating (plus supply/admin in Air Force)

TABLE 12  
FINAL REENLISTMENT MODEL

Variables	Probit Coefficients			
	ARMY	NAVY	AIR FORCE	USMC
RACE4( - )	-.449***	-.426***	-.630***	-.466***
HHCL	.182***	.269***	.208***	.238***
AGE	.003	.001	-.053**	.023
NONTECH	.103	.013	.005	.295**
SUPADMIN	.230*	.009	-.082	.244*
MEDDEN	.340*	.282	.423	na
QLS( - )	-.551***	-.590***	-.496***	-.528***
FRS( - )	-.024	.013	-.081*	-.090
PPB( - )	-.889	-1.95***	.687	-.939
FPB( - )	-.172***	-.069*	-.007	-.061
PROMOPP( - )	-.0002	-.047	-.158***	.013
SPOUSEINC	-.00002	.00002*	-.00003**	.00003
DEBT	.00005***	.00004***	.00005***	.00003**
FINDING( - )	-.625***	-.959***	-.980***	-.563***
ADVRATE	.079	.827**	-.032	.595
LOS	.150**	.044	.068	.072
No. Cases	710	771	650	776

( - ) = hypothesized negative relationship

\*\*\* = t significance level  $\leq .01$

\*\* = t significance level  $\leq .05$

\* = t significance level  $\leq .10$

- more dissatisfied with pecuniary and non-pecuniary factors
- less satisfied with promotion opportunities
- lower or no outstanding debts
- more likely to find civilian employment
- are promoted at lower pace than constituents (except in the Air Force)
- have less time in service

A more detailed discussion of the results of the final reenlistment models as shown in Table 12 follows. The variables will be discussed within the five categorical groupings, demographic, tenure, cognitive/affective, economic, and employment alternatives. The discussion of final reenlistment model results will incorporate measures of responsiveness of estimated reenlistment likelihood for changes in important explanatory variables. To ascertain a measurement of responsiveness probabilities for reenlistment intentions were calculated at the mean values of all candidate explanatory variables used in the final reenlistment model. These probabilities, calculated separately for each service, represent the likelihood of a serviceman who has the average characteristics of the sample reenlisting. Then while holding all other explanatory variables constant at their mean values, the explanatory variable was increased by an increment of one unit to observe changes in the likelihood of reenlistment that could be directly attributed to that particular variable. Table 13 contains a comparative listing of several prominent variables and serves to illustrate the change in reenlistment intentions attributed to a unit change in a single explanatory variable. For example, whites were compared to nonwhites by substituting the dummy variable values 0 (nonwhite) and 1 (white) into the reenlistment model to assess change in reenlistment behavior of the average serviceman owing only to his race. For the Army, a white soldier with average other characteristics is estimated to reenlist with a likelihood of 21.45%, while a black soldier with average other characteristics is estimated to reenlist with a likelihood of 36.69%. For HHC1, AGE, DEBT, and LOS, the respective increments in the variables were +1 for dependent, +1 year for age, +\$1000.00 for debt, and +1year for additional service respectively.

The results of these individual runs as shown in Table 13 illustrate the differences in the likelihood of reenlistment behavior of the average serviceman and provides some insight into the relative importance of areas to be considered when formulating retention policies.

## **1. Demographic Variables**

### ***a. Race***

Non-whites, which includes Blacks, Hispanics, and other minorities, are more likely to reenlist than whites. The regression coefficients were relatively consistent across the four services and were statistically significant at the .01 level. At the mean value of each remaining independent variable, the probability of reenlistment for the average nonwhite serviceman increased by approximately 10-15% depending on his branch of service.

TABLE 13  
PROBABILITIES OF REENLISTMENT

Variables	PROBABILITIES			
	ARMY	NAVY	AIR FORCE	USMC
RACE2				
White	21.45*	16.98*	29.16*	09.28*
Nonwhite	36.69*	29.85*	46.77*	19.55*
HHC1				
Avg. #depns	26.43*	19.94*	34.16*	11.82*
Avg. +1 depn	33.75*	28.30*	42.03*	17.21*
AGE				
Avg. Age	26.43	19.94	34.16*	11.82
Avg. +1 yr.	26.46	19.97	31.21*	17.01
Occupation				
TECH	22.54	19.35	33.98	08.31*
NONTECH	25.75	19.46	34.02	10.63*
SUPADMIN	30.01*	19.38	33.34	09.29*
MEDDEN	33.96*	19.80	34.35	na
DEBT				
Avg. Debts	26.43*	19.94*	34.16*	11.82*
Avg. + \$1000	28.10*	21.17*	35.64*	13.70*
LOS				
Avg. LOS	26.43*	19.94	34.16	11.82
Avg. +1 yr.	31.56*	21.19	36.69	13.31

Note: all table figures are percentages

\* = t significance level  $\leq .10$

### *b. Household composition (dependents)*

As expected, servicemen with dependents, which includes spouse and/or children, or other dependents (eg. parents, other relatives, etc.) are more likely to reenlist than those with no dependents. At the mean value of each remaining independent variable, the probability of reenlistment increased by approximately 6-8% for the average serviceman as he acquired one new/additional dependent.

### *c. Current age*

Current age was not found to be statistically significant at a .10 level or less for any service except the Air Force. Surprisingly, only for the Air Force sample was the relationship between age and the probability of reenlistment found to be negative, implying that the older the airman, the less likely he is to reenlist. At the mean value of each remaining independent variable, the likelihood of reenlistment for the average Air Force airman drops by roughly 3% as he gets one year older.

### *d. Occupational groupings*

Servicemen in technical occupations were utilized as the base group for analysis as they comprised the highest percentage of each service sample. Servicemen in non-technical, supply and administrative, and medical or dental occupational specialties were more likely to reenlist than men in technical ratings for the Army, Navy and Marine Corps (note that the Marine Corps has no dedicated medical/dental specialists). For the Air Force, airmen in non-technical and medical/dental specialties were also more likely to reenlist than technicians, but supply and administrative personnel were less likely to reenlist than technicians. Statistically significant coefficients varied among the occupational specialties and within the service branches. At the mean value of the remaining independent variables, the increase in the likelihood of reenlistment for statistically significant ( $t \leq .10$ ) occupations indicate that in the Army, the average supply and administrative soldiers as well as medical/dental personnel were roughly 7-11% more likely to reenlist than the average technician. For the Marines, nontechnicians and the supply and administrative personnel were 1-2% more likely to reenlist than their technical counterparts. No significant differences exist in the likelihood of reenlistment intentions between occupations in the Navy and Air Force.

## **2. Cognitive/Affective Variables**

### *a. Quality of military service life (QLS)*

This variable showed that significant differences do exist in the probabilities of reenlistment, at the .01 level, across all four service branches. Probit coefficients



were relatively close in magnitude, ranging from -.502 (Air Force) to -.564 (Army). Thus the more dissatisfied a servicemember was with his job surroundings, co-workers, supervisors, work conditions, and job autonomy, the lower the probability of reenlistment.

*b. Family related security (FRS)*

Only in the Air Force sample was family related security statistically significant at the .10 level. This was not surprising in view of the youthfulness of the sample populations, mean ages from 22 (Army, Marines) to 23 (Navy, AirForce), low mean numbers of dependents ranging from .5 (Marines) to .9 (Air Force), and the fact that the majority of respondents (61.2%) have not undertaken a second permanent change of station (PCS) move. The negative coefficients support the hypothesis that the more dissatisfied servicemen are with job security, medical/dental and commissary benefits, and the military family environment, the lower the likelihood of reenlistment.

*c. Present pecuniary benefits (PPB)*

This variable was statistically significant at the .01 level for the Navy sample only. The less satisfied with present pay allowances, and retirement benefits, the less likely a sailor is to reenlist. This variable did not have any effect on reenlistment intentions for the remaining three services.

*d. Future pecuniary benefits (FPB)*

Future pecuniary benefits were statistically significant for the Army at the .01 level, and Navy at the .10 level. The less favorable view the respondent had regarding military pay and allowances keeping pace with inflation, and regarding retirement benefits for future servicemen, the less likely he is to reenlist. This variable did not have any effect on the reenlistment decision for the Air Force and Marine Corps samples respectively.

*e. Promotion opportunity*

Promotion opportunity showed a significant difference in the reenlistment decision for the Air Force sample only. The probit coefficient was significant at the .01 level. The less favorable an airman viewed his future chances for promotion to the next higher paygrade, the less likely he is to reenlist. This variable did not have any effect on the reenlistment decision for the remaining service branches.

### 3. Income and economic incentives

#### *a. Amount of outstanding debts*

This variable showed that the higher the current outstanding debts, the greater the likelihood of reenlistment. Outstanding debts showed significant differences at the .01 level for all four services. Table 13 shows that as the average serviceman incurs an additional \$1000.00 in new debt, the likelihood of reenlistment increases by roughly 2%.

#### *b. Spouse earnings*

The level of spouse earnings showed significant differences in the reenlistment decision for the Navy and Marine Corps samples, at the .05 level. The higher the level of spousal income, the more likely the serviceman is to reenlist. Due to the small probit coefficients for the spouse earnings variables, and low mean level of those earnings (between \$1100 to \$1300), the overall effects of this variable on the reenlistment decision of Navy and Marine servicemen is modest at best. This variable did not have any effect on the reenlistment decision for the Army or Air Force.

### 4. Employment alternatives

#### *a. Chances of finding a good civilian job*

This variable showed significant differences in reenlistment intentions at the .01 level for all four branches of service. Probit coefficients ranged from -.548 (Marines) to -.978 (Air Force). A more favorable opinion as to the chances of finding a good civilian job, should the serviceman leave the military, increases the likelihood of that individual not reenlisting in the respective service.

### 5. Tenure

#### *a. Advancement pace (ADVRATE)*

Except for the Navy sample, ADVRATE did not have any significant effect on reenlistment intentions. For the Navy, ADVRATE was significant at the .05 level, implying that the quicker a sailor advances to the next paygrade, the higher the likelihood of that individual reenlisting.

#### *b. Length of service*

Except for the Army sample, length of service was not found to cause significant differences in reenlistment intentions of first-term males. For the Army, length of service was significant at the .05 level and implies that the longer a soldier remains in the Army, the greater the likelihood of him reenlisting. As Table 13 shows, the only significant increase in the likelihood of reenlistment is in the Army where the average soldier completing one additional year of service is roughly 5% more likely to reenlist.

### C. VALIDATION OF THE REENLISTMENT MODEL

To examine the validity and accuracy of the predictions of the final reenlistment models, the predicted probabilities of reenlistment for the four samples were computed separately using the probit coefficients developed and displayed in Table 12. These results were then compared by branch of service to the mean value of the reenlistment intention variables for each of the four services, those being .274 (Army), .241 (Navy), .373 (Air Force), and .151 (Marine Corps) respectively. This mean value was utilized as the cut-off point for reenlistment intent. Cases where the predicted probability value, as calculated from the respective models, were greater than the cut-off point were predicted to reenlist. Cases with a predicted probability value lower than the cut-off point were predicted to not reenlist. Predicted reenlistment intentions based on the model and variable values were compared to known (classified as "actual") reenlistment intentions as reported by the respondents themselves in the 1985 DoD Survey. These comparisons are shown for each branch of service in Tables 14 to 17 respectively.

All four models were consistent in their abilities to correctly predict which serviceman would reenlist and those who would not reenlist. As can be seen, the overall accuracy of the respective services' model predictions were: 70.3% (Army), 75.6% (Navy), 70.8% (Air Force), and 69.2% Marine Corp) correct predictions based on the model specification and individuals' characteristics. The results were mixed as to which service model performed best in predicting reenlistees as opposed to nonreenlistees. The Army and Marine models predicted reenlistees better than nonreenlistees. The Navy and Air Force models were better at predicting personnel most likely to not reenlist as opposed to potential reenlistees. The relative closeness of the overall accuracies indicates that each model is essentially equal in its predictive power.

TABLE 14  
ACTUAL VS. PREDICTED REENLISTMENTS

ARMY			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No (513)	69.0%	31.0%
	Yes (197)	28.1%	71.9%

n = 710

% correctly classified : 70.3%

TABLE 15  
ACTUAL VS. PREDICTED REENLISTMENTS

NAVY			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No (598)	76.9%	33.1%
	Yes (173)	28.9%	71.1%

n = 771

% correctly classified : 75.6%

TABLE 16  
ACTUAL VS. PREDICTED REENLISTMENTS

AIR FORCE			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No (408)	72.1%	28.9%
	Yes (242)	31.4%	68.6%

n = 650

% correctly classified : 70.8%

TABLE 17  
ACTUAL VS. PREDICTED REENLISTMENTS

MARINES			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No (665)	69.2%	30.8%
	Yes (111)	30.6%	69.4%

n = 776

% correctly classified : 69.2%



## 1. Reduced Reenlistment Model

Finally, reduced predictive models were exercised for each branch of service utilizing only those independent variables from Table 12 found to be statistically significant at the .10 level or lower. Probit coefficients were recalculated for these reduced models for model validation purposes. Again, the smaller the model, the lower the maintenance cost of the model in terms of data collection efforts, computer costs, etc., as well as simpler interpretation for policy implications.

The coefficient estimates from new probit analyses were utilized to compute reenlistment probabilities to validate the accuracy of a reduced models' predictions while using the same mean cut-off values of the reenlistment intention variables. These mean cut-off values were compared to the predicted reenlistment probabilities as calculated from the reduced models and the results are shown in Tables 18 to 21 respectively.

As can be seen, the overall predictive accuracies of the reduced models compare favorably to the full models. The reduced models were not quite as accurate as the full models in overall percent correctly classified. The overall accuracy figures for the respective models were: 68.8% (Army), 73.9% (Navy), 71.6% (Air Force), and 68.7% (Marine Corps). However, the reduced reenlistment models were slightly better than the full models in correctly predicting those who would reenlist for all four services. For example, the full model in the Army correctly classified 71.9% of those soldiers likely to reenlist while the reduced model for the Army correctly classified 73.3% of those soldiers likely to reenlist. For the remaining three services the comparison of full versus reduced model accuracy for correctly classifying likely reenlistees were 71.1% versus 75.4% in the Navy, 68.6% versus 69.1% in the Air Force, and 69.4% versus 69.9% in the Marines. In general, the reduced models were essentially as stable as their larger counterparts in their overall predictive accuracies.

TABLE 18  
ACTUAL VS. PREDICTED REENLISTMENT(REduced MODEL)

ARMY			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No ( 527 )	67.0%	33.0%
	Yes ( 206 )	26.7%	73.3%

n = 733

% correctly classified : 68.8%

TABLE 19  
ACTUAL VS. PREDICTED REENLISTMENT(REduced MODEL)

NAVY			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No ( 641 )	73.5%	36.5%
	Yes ( 199 )	24.6%	75.4%

n = 840

% correctly classified : 73.9%

TABLE 20  
ACTUAL VS. PREDICTED REENLISTMENT(REduced MODEL)

AIR FORCE			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No ( 415 )	73.0%	27.0%
	Yes ( 246 )	30.9%	69.1%

n = 661

% correctly classified : 71.6%

TABLE 21  
ACTUAL VS. PREDICTED REENLISTMENT(REduced MODEL)

MARINES			
Predicted Reenlistments			
		No	Yes
Actual Reenlistment	No ( 696 )	68.5%	31.5%
	Yes ( 123 )	30.1%	69.9%

n = 819

% correctly classified : 68.7%

## V. ANALYSIS OF RESERVE INTENTIONS

### A. MODEL ESTIMATION FOR RESERVE INTENTIONS

As with reenlistment intentions, bivariate correlations and variable categorical probit analyses were conducted within each branch of service to reduce the number of candidate independent variables for the final reserve intentions models.

Table 22 shows the results of the probit analyses conducted on the five independent variable categories within each branch of service. These results highlighted some possible multicollinearity problems concerning the number of dependents (HHC1), age (E35), and length of service (E6) variables. The signs of the probit coefficients were not consistent across the four services, and in some instances differed from hypothesized relationships with the reserve participation variable based on results of prior research efforts, an indication of possible multicollinearity.

Burright et al., (1982), in their study of nonprior service personnel who joined the reserves, found that reservists with dependents were less likely to reenlist in the selected reserves (SELRES) which would imply a negative coefficient sign for the HHC1 variable. Burright et al., (1982) and Quester (1983), who studied prior service NAVETS in the reserves, found that the older the serviceman, the more likely he is to enlist/reenlist in the SELRES, implying a positive relationship between the age variable and the reserve intentions variable. Length of service (E6) is subject to various interpretations by the respondent. One interpretation could be that the longer a serviceman has vested in military service, even though he leaves the active military for various reasons, the non-pecuniary benefits of military affiliation, as well as retirement benefits, will cause him to preserve such benefits by joining the reserves. This would lead to a positive relationship between length of service and reserve intentions. Conversely, another interpretation could be the longer the serviceman has vested in the active forces, the less likely he is to leave, thus the less likely his is to quit and then join the reserves. This would lead to a negative relationship between length of service and reserve intentions.

The simple bivariate correlations of the statistically significant independent variables supported the relationships which resulted from probit analyses conducted within the individual services. Additional probit analyses were conducted on these

TABLE 22  
PRELIMINARY RESERVE MODEL

VARIABLES	Probit Coefficients			
	AIR			
Demographic	ARMY	NAVY	FORCE	USMC
RACE4( - )	-.370***	-.453***	-.398***	-.572***
HHC1	.017	.005	.007	-.026*
AGE	.002	-.054**	.027	-.061**
NONTECH	-.019	.061	.205*	.256**
SUPADMIN	.128	.033	-.133	-.032
MEDDEN	-.145	.692***	.081	na
Cognitive/ Affective				
QLS( - )	-.367***	-.441***	-.188*	-.266***
FRS( - )	-.001	-.007	.0003	.005
PPB( - )	-.395	-.770	-.980*	-1.21*
FPB( - )	-.146**	-.042	-.068	-.083
PROMOPP( - )	-.083*	.098**	.014	-.024
Income				
INCOME2( - )	-.046	-.024	-.133*	.128*
DEBT	.038	-.004	.072**	.047
Employment Alternatives				
SEARCH( - )	-.009	.059	.281*	-.141
OFFERS( - )	-.227	-.170	-.206	-.0002
FINDING( - )	-.295**	-.068	.014	-.034
Tenure				
PAYGRADE	.149*	.165**	.057	.268***
LOS( - )	-.004	-.221***	-.011	-.084
No. Cases	424	533	372	551

( - ) = hypothesized negative relationship

\*\*\* = t significance level  $\leq .01$

\*\* = t significance level  $\leq .05$

\* = t significance level  $\leq .10$



independent variables with any suspect variables being deleted one at a time from the reserve model. In each instance, no coefficient sign changes or significant changes in the magnitude of the remaining coefficient values were noted, leading to the belief that multicollinearity, if present, is not severe enough to significantly hamper interpretation of each model's results.

Similar to findings in the reenlistment model, the variables INCOME2, job search (E90), job offers (E91), and paygrade (E5) were found to either contribute little to understanding the reserve decision or were alternate measures of the reserve intention variable. These variables were dropped from the final model. Promotion pace (ADVRATE) and spouse earnings (E95) were again added to the reserve model, principally to facilitate the analysis of a common set of reenlistment and reserve intention variables.

## B. RESULTS OF RESERVE DECISIONS

The results of probit analyses of the final reserve intentions models for each branch of service are shown in Table 23.

The likelihood of an individual joining the reserves, given that he is not reenlisting in the active forces, is derived from the following equation: (Army example)

$$\begin{aligned} Z^* = & 1.679 - .499RACES + .093HHC1 - .032E35 - .165NONTECH \\ & - .048SUPADMIN - .474MEDDEN - .414QLS - .090FRS - .363PPB \\ & + .124FPB + .143E105K - .00001E95 - .00001DEBT \\ & - .060E92 + .099ADVRATE + .117E6 \end{aligned}$$

Similar equations can be constructed for the other three services using the probit coefficients listed under each respective service.

Interpretation of the number resulting from the equations is conducted in the same manner as for the reenlistment models. From Table 23 it can be seen that the highest probability for joining the reserves will be for an individual with the following characteristics:

- non-white
- having several dependents (except Navy)
- 18 years old (30 in the Air Force)
- in technical ratings for the Army
- in nontechnical or medical ratings for Navy
- in nontechnical ratings for Air Force and Marines

- more satisfied with job pecuniary and non-pecuniary factors and family security issues
- more optimistic about promotion opportunities
- having some level of outstanding debts
- less likely to find suitable civilian job
- advance at quicker pace (Air Force)
- having more time in service (Army, Marines)

The smallest probability of an individual joining the reserves results from the opposing measures of the above variables, eg. white, less satisfied with job pecuniary and non-pecuniary factors and family security issues, no debts, etc.

A more detailed discussion of the results of the final reserve models, as shown in Table 23, follows. Similar to what was done for the reenlistment decision, the discussion of final reserve model results will incorporate measures of responsiveness of estimated reserve participation likelihood for changes in important explanatory variables. Table 24 contains a comparative listing of several statistically significant ( $t \leq .10$ ) variables and the change in the likelihood of a serviceman, who has the average characteristics of the sample, joining the reserves. Again each explanatory variable is held constant at its mean value while each of the significant explanatory variables are increased by one unit to observe changes in the likelihood of joining the reserves that can be directly attributed to that particular explanatory variable.

### 1. Demographic Variables

#### *a. Race*

Non-whites, which includes Blacks, Hispanics, and other minorities, are more likely to join the reserves than whites. Probit coefficients for all four services were statistically significant at the .01 level. At the mean value of each remaining independent variable, the likelihood of joining the reserves for the average non-white serviceman was between 11-25% higher than for the average white serviceman, depending on his branch of service.

#### *b. Household composition (dependents)*

Household composition did not account for any significant differences in reserve intentions for the Army and Marine Corps samples. Results were mixed for the Navy and Air Force. For the Navy, household composition was statistically significant at the .05 level. The average sailor gaining one dependent was found about 5% less likely to join the reserves. For the Air Force, household composition was also

TABLE 23  
FINAL RESERVE MODEL

Variables	Probit Coefficients			
	ARMY	NAVY	AIR FORCE	USMC
RACE4( -)	-.499***	-.356***	-.315**	-.470***
HHC1	.093	-.140**	.119*	.101
AGE	-.032	-.047*	.025	-.067**
NONTECH	-.165	.051	.201	.084
SUPADMIN	-.048	.004	-.268*	-.142
MEDDEN	-.474*	.576**	-.693*	na
QLS( -)	-.414***	-.427***	-.175*	-.172**
FRS( -)	-.090	-.075	-.130*	-.172**
FPB( -)	-.363	-.420	-.835	-.818
FPB( -)	.124*	.028	-.033	-.064
PROMOPP( -)	.143***	.035	.033	-.078*
SPOUSEINC	-.00001	.00001	-.00001	.00001
DEBT	-.00001	.00003*	.00002	.00002
FINDING( -)	-.060	-.189	-.723***	-.113
ADVRATE	.099	-.453	-.669	1.257**
LOS	.117*	-.164***	-.032	.135**
No. Cases	413	524	364	547

(-) = hypothesized negative relationship

\*\*\* = t significance level  $\leq .01$

\*\* = t significance level  $\leq .05$

\* = t significance level  $\leq .10$

statistically significant at the .05 level, and an average airman gaining one dependent was 5% more likely to join the reserves.

*c. Current age*

Age did not account for any significant differences in reserve intentions for the Army and Air Force samples. For the Navy, age was statistically significant at the .10 level, and an average sailor aging one more year was about 2% less likely to join

TABLE 24  
PROBABILITY OF JOINING RESERVES

Variables	PROBABILITIES			
	ARMY	NAVY	AIR FORCE	USMC
RACE2				
White	33.14	23.70	36.99	26.89
Nonwhite	34.31	49.02	49.32	44.19
HHC1				
Avg. #depns	NS	40.52	39.70	NS
Avg. +1 depn		35.42	44.35	
AGE				
Avg. Age	NS	40.52	NS	31.10
Avg. +1 yr.		38.70		28.80
Occupation				
TECH	42.27	38.63	38.93	NS
NONTECH	NS	NS	NS	NS
SUPADMIN	NS	NS	NS	NS
MEDDEN	39.00	39.92	18.04	na
DEBT				
Avg. Debts	NS	40.52	NS	NS
Avg. + \$1000	NS	45.02	NS	NS
LOS				
Avg. LOS	NS	40.52	NS	31.10
Avg. +1 yr.	NS	34.31	NS	36.41

Note: all table figures are percentages

NS = change is not significant ( $t > .10$ )

the reserves. For the Marines, age was statistically significant at the .05 level and the average Marine getting one year older was found to be roughly 2% less likely to join the reserves.

#### *d. Occupational groupings*

Servicemen in technical occupations were utilized as the base group for analysis, similar to the reenlistment study. Again, findings were mixed across the occupations and branch of service. There were no significant differences in reserve affiliation intentions between personnel in nontechnical occupations as compared to technical occupations. There were no significant differences between the supply/administrative occupations and technical ratings, except at the .10 level in the Air Force. Supply and administrative personnel were roughly 7% less likely to join the reserves than the average airman technician. In the medical and dental occupations, only the Marine Corps (who lack medical and dental specialties) does not have significant differences in reserve intentions as compared to technical specialties. For the Army and Air Force, the medical/dental specialties were significantly different at the .10 level, and were found to be 3% and 20%, respectively, less likely to join the reserves than their technical counterparts. In the Navy, the average medical and dental specialists were significantly different at the .05 level and were about 1% more likely to join the reserves than sailors in technical ratings.

### **2. Cognitive/Affective Variables**

#### *a. Quality of military service life (QLS)*

This variable showed significant differences do exist in the likelihood of joining the reserves at the .01 level for the Army and Navy, and at the .05 level for the Air Force and Marine Corps samples. This implies that a servicemember who is more dissatisfied with his job surrounding, co-workers, supervisors, working conditions, job autonomy, etc., has a lower probability of joining the reserves.

#### *b. Family related security (FRS)*

Family related security had no significant effects on the probability of joining the reserves for the Navy and Air Force samples. FRS was found to be significantly different at the .10 and .05 levels for the Army and Marine Corps samples respectively. The less satisfied an airman or Marine is with his perceptions of job security, medical/dental and commissary benefits, and the military family environment, the lower the probability of his joining the reserves.

#### *c. Present pecuniary benefits (PPB)*

Present pecuniary benefits accounted for no significant differences in the likelihood of joining the reserves.



***d. Future pecuniary benefits (FPB)***

Future pecuniary benefits accounted for no significant differences in the likelihood of joining the reserves.

***e. Promotion opportunity***

Promotion opportunity showed a significant difference in the reserve decision for the Army sample only. The probit coefficient was significant at the .05 level, and implies that the less optimistic a soldier is regarding his promotion opportunities, the less likely he is to join the reserves.

**3. Income and economic incentives**

***a. Spouse earnings***

The level of spouse earnings accounted for no significant differences in the likelihood of joining the reserves.

***b. Amount of outstanding debts***

This variable accounted for significant differences in the likelihood of joining the reserves for the Navy sample only, at the .10 level. This variable shows that as the average sailor takes on an additional \$1000.00 debt, the more likely he is to join the reserves. The low significance levels and small probit coefficients indicate only a modest impact on the reserve affiliation decision, 5% in this case.

**4. Employment alternatives**

***a. Chances of finding a good civilian job***

This variable accounted for significant differences in the reserve affiliation decision for the Air Force sample only. The probit coefficient was significant at the .01 level and indicates that the better the chances of finding a good civilian job, the lower the probability of joining the reserves.

**5. Tenure**

***a. Advancement pace (ADVRATE)***

Advancement pace, the rapidity with which a serviceman advances to the next higher paygrade, was found to be statistically significant only for the Air Force sample, and at the .05 level. This variable implies that the quicker an airman advances, the more likely his is to continue his military affiliation by joining the reserves.

***b. Length of service***

Length of service accounted for significant differences in the reserve affiliation decision for the Navy and Marine Corps samples only. In the Navy, length of service was statistically significant at the .01 level, and showed that the average

sailor with one additional year of service was about 6% less likely to join the reserves. This may be interpreted as the sailor is less likely to get out of the Navy to join the reserves the longer he remains on active duty. For the Marine Corps, the length of service was statistically significant at the .10 level, and is interpreted as the more time a Marine has in the service, the higher the likelihood of joining the reserves once he leaves active duty. The average Marine with one additional year of service is about 5% more likely to join the reserves, possibly to retain desired pecuniary and non-pecuniary benefits acquired through his active duty efforts.

### **C. VALIDATION OF THE RESERVE MODEL**

The individual reserve models were validated using the same methodology as with the reenlistment models. Predicted results of the reserve models were compared to reserve intention cutoff points. These cutoff points were the mean values of the reserve intention variables for each of the four services, those being .522 (Army), .415 (Navy), .376 (Air Force), and .352 (Marines). Cases where the predicted probabilities were greater than the cutoff points were classified as joining the reserves, cases predicted below the cutoff points were classified as civilians. Predicted reserve intentions were compared to cases classified as "actually" joining the reserves. These results are shown in Tables 25 to 28 respectively.

All four models were consistent in their abilities to correctly predict reserve intentions regarding those personnel who would or would not join the reserves. As can be seen in Tables 25 to 28, the overall accuracy of the respective services model predictions were 65.6% (Army), 65.6% (Navy), 66.7% (Air Force), and 67.0% (Marine Corps) correct predictions based on individuals' characteristics and the specified reserve model.

TABLE 25  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION

ARMY			
Predicted Joins Reserves			
		No	Yes
Actual Joins Reserves	No (200)	66.5%	33.5%
	Yes (213)	32.9%	67.1%

n = 413

% correctly classified : 66.8%

TABLE 26  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION

NAVY			
Predicted Joins Reserves			
		No	Yes
Actual Joins Reserves	No (322)	69.6%	30.4%
	Yes (202)	37.6%	62.4%

n = 524

% correctly classified : 66.8%

TABLE 27  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION

AIR FORCE			
Predicted Joins Reserves			
		No	Yes
Actual Joins Reserves	No (234)	68.8%	31.2%
	Yes (130)	38.5%	61.5%

n = 364

% correctly classified : 66.2%

TABLE 28  
ACTUAL VS PREDICTED RESERVE PARTICIPATION

MARINES			
Predicted Joins Reserves			
		No	Yes
Actual Joins Reserves	No (374)	74.1%	25.9%
	Yes (173)	45.7%	54.3%

n = 547

% correctly classified : 67.8%

## 1. Reduced Reserve Model

As with the reenlistment models, reduced predictive models were exercised for each branch of service utilizing only those independent variables from Table 23 found statistically significant at the .10 level or lower. The coefficient estimates from the smaller probit analyses were utilized to predict reserve affiliation intentions, and compared with the same mean reserve intention cutoff points. Tables 29 to 32 show the results of the comparisons from these smaller models.

As can be seen, the overall predictive accuracies of the reduced models are slightly lower in three of the four services as compared to the full models. The overall accuracy figures for the respective reduced reserve models were 62.4% (Army), 66.7% (Navy), 62.7% (Air Force), and 61.1% (Marine Corps). The reduced reserve affiliation intentions models for the Army, Navy, and Air Force were better at predicting which servicemen were not likely to join the reserves than the full models. For example, the full model in the Army correctly classified 66.5% of those soldiers not likely to join the reserves while the reduced model correctly classified 72.8% of those soldiers not likely to join the reserves. Comparison of the full versus reduced reserve intentions models show that 69.6% versus 71.6% were correctly classified as not likely to join the reserves for the Navy, and 68.8% versus 83.5% were correctly classified as not likely to join the reserves for the Air Force. The reduced reserve affiliation intentions models are considered as stable in their predictions as their full counterparts.

TABLE 29  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION(REDUCED)

ARMY			
Predicted Join Reserves			
		No	Yes
Actual Join Reserves	No (228)	72.8%	27.2%
	Yes (246)	47.2%	52.8%

n = 474

% correctly classified : 62.4%



TABLE 30  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION(REDUCED)

NAVY			
Predicted Join Reserves			
		No	Yes
Actual Join Reserves	No ( 341 )	71. 6%	28. 4%
	Yes ( 214 )	40. 1%	59. 9%

n = 555

% correctly classified : 66.7%

TABLE 31  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION(REDUCED)

AIR FORCE			
Predicted Join Reserves			
		No	Yes
Actual Join Reserves	No ( 254 )	83. 5%	16. 5%
	Yes ( 151 )	72. 2%	27. 8%

n = 405

% correctly classified : 62.7%

TABLE 32  
ACTUAL VS. PREDICTED RESERVE PARTICIPATION(REDUCED)

MARINES			
Predicted Join Reserves			
		No	Yes
Actual Join Reserves	No ( 419 )	60.6%	39.4%
	Yes ( 192 )	38.0%	62.0%

n = 611

% correctly classified : 61.1%

## VI. CONCLUSION

### A. FINDINGS OF THE STUDY

This thesis developed and tested a simple model to analyze the likelihood of continued military affiliation of first-term enlisted males in the armed forces. Five categories of explanatory variables, namely demographic, cognitive/affective, economic, employment alternatives, and tenure, were utilized to explain the military affiliation decision.

Reenlistment intentions were presented in Chapter III, with the primary finding being that five explanatory variables consistently influence the reenlistment decision in each of the four services: race, household composition (number of dependents), level of outstanding debts, the likelihood of finding suitable civilian employment, and the composite variable, quality of military service life (QLS). The (QLS) variable was a composite measure of absolute satisfaction levels of the serviceman with his job, job environment (co-workers, working conditions, autonomy, supervisors, etc.), and the family environment at his military station (available medical/dental facilities, housing, etc.) It was theorized that a higher number of dependents and higher level of outstanding debts would increase the likelihood of reenlistment. It was also predicted that non-whites, servicemen dissatisfied with the quality of military service life, and servicemen with poor chances of finding acceptable civilian employment would be less likely to reenlist. The final reenlistment model shown in Table 12 shows that the coefficients of these five variables had the expected signs and were statistically significant at the .01 level.

Reserve affiliation intentions were presented in Chapter IV, with the primary finding being that, for data obtained from the 1985 DoD Survey, only two explanatory variables consistently influence the reserve affiliation decision in each of the four services: race, and the composite variable, quality of military service life (QLS). The (QLS) variable measured the absolute satisfaction levels of the servicemen with the attributes of his job, job environment, and military family environment. As with reenlistment intentions, it was theorized that non-whites were more likely to join the reserves than whites, and servicemen more dissatisfied with the quality of military service life would be less likely to join the reserves. The final reserve affiliation model

shown in Table 23 shows that the coefficients of these two variables had the expected signs and were statistically significant at the .01 level, slightly lower for the Air Force sample.

The candidate explanatory variables used in the reenlistment model were also used in the reserve affiliation model. In general, the reenlistment model accurately classified servicemen as either likely to reenlist or not likely to reenlist from between 69.4 % (Marines) to 75.6% (Navy). The reserve affiliation model accurately classified servicemen as either likely to join the reserves or not join the reserves from between 65.6% (Army, Navy) to 67.0% (Marines). Reduced models for each of these two affiliation decisions utilizing only explanatory variables found to be statistically significant within each branch of service produced overall accuracies slightly lower than the full models.

### **1. Demographic Variables**

Outside of race and household composition, no other demographic variables were found to be consistently significant in explaining reenlistment intentions across the four services. The current age of the servicemen, for this survey sample, did not significantly affect the reenlistment decision except in the Air Force. The negative coefficient for age in Table 12 is counterintuitive and not readily explained nor empirically supportable within this study. It may be that older Air Force respondents have higher education levels, including college, and higher AFQT scores which place them in higher skilled occupations more closely related to equivalent civilian occupations. These airman would then parlay their higher education levels and inexpensively acquired general training from the Air Force into a more highly marketable package to offer civilian employers. Thus, having acquired the desired general training afforded by the Air Force to increase employability in the civilian market, the older first-termer has completed his military service "experience" and has little utility for continued active duty military affiliation. With one minor exception, servicemen in occupations other than technical were found to be, in general, more likely to reenlist in their respective services than those in technical occupations.

For the reserve affiliation model, excluding race, no other explanatory variable was found to consistently affect the reserve affiliation decision across the four services. Although not statistically significant enough to affect the reserve affiliation decision, the negative coefficients for the age variable in Table 23 for the Army, Navy and Marine samples indicates that unlike the Air Force, the older these servicemen, the less

likely they are to join the reserves. This confirms findings of the reenlistment model, since older servicemen in these three service branches are more likely to reenlist they are then less likely to get out to join the reserves. For the Air Force sample, the statistically significant ( $t \leq .05$ ) and positive coefficient implies that although older airmen choose not to reenlist, they are more inclined to view the Air Force Reserves (or National Guard) as a viable option to possibly acquire additional training, moonlight to maintain retirement benefits, or to retain non-pecuniary benefits such as service to country and camaraderie not readily available in the civilian sector. These findings support the need for further study concerning the interrelationships of age, education, and occupation, within this data set, to more convincingly establish the impact of age on reenlistment/reserve intentions, especially in the Air Force.

Across occupations, soldiers in technical specialties are more likely to join the Army Reserves than other occupational specialties, while the opposite is true in the Navy where technically oriented sailors are less likely to opt for reserve duty than other occupational groupings. Results were mixed in the Air Force and Marine samples. In general, it appears that military affiliation decisions are not very sensitive to military occupation groupings for these samples, and implies that other factors besides occupation weigh heavier on the complex military affiliation decision.

## **2. Affective/Cognitive Variables**

It was found that military affiliation intentions were very sensitive to the level of satisfaction the serviceman has regarding the quality of military service life. Essentially, the more dissatisfied he is with his military job and job environment, such as working relations with his co-workers and supervisors, his sense of autonomy while on the job, his physical working conditions, etc., as well as the military family environment (availability of family services, housing, etc.) provided, the less likely he is to either reenlist or join the reserves. With few exceptions, it was found that the more dissatisfied the serviceman is with the military environment in general, as measured by statistically significant variables in the family related security, present and future pecuniary benefits, and advancement opportunity categories, the less likely he is to continue his affiliation with the military. As with (QLS), family related security (FRS) is a composite variable which measures serviceman's absolute satisfaction level with attributes such as job security and the adequacy of medical/dental health care.

Two exceptions to this generalization occurred in the reserve model. In the Army sample, future pecuniary benefits as measured by satisfaction levels with pay



keeping pace with inflation and future retirement benefits being as good as the present, showed a positive impact on the reserve affiliation decision. This implies that the more dissatisfied the soldier is with these benefits, the more likely he is to join the reserves. Also in the Army sample, the positive promotion opportunity coefficient implies that as soldiers become more dissatisfied with their chances for advancement, the more likely they are to join the reserves. It is possible that for both of these variables the respondents may have used, for comparison purposes, their impressions of poor future pecuniary benefits and lower chances for advancement in the active forces as reasons to leave active duty for possibly better opportunities in the reserves.

### **3. Income and Economic Variables**

The level of outstanding debts was found to significantly affect reenlistment intentions in that the higher the level of debt, the more likely the serviceman is to reenlist. For the reserve model, only in the Navy sample was level of debt found to significantly impact on the reserve affiliation decision, but to a lesser degree than in the reenlistment model. This seems to indicate that servicemen view military service as a source of steady income which may encourage taking on debt, or that alternative employment opportunities in the civilian sector may not be sufficient or secure enough to entice him to leave the service with some level of existing debt. The general lack of significance of this variable in the reserve model, however, may indicate that joining the reserves may not necessarily be driven by the need for higher income levels owing to increased debt. This view tends to support Burright, et.al, (1982), and others, who suggest that reserve participation/moonlighting is driven by qualitative factors equal to or possibly greater than the need for additional income.

### **4. Alternative Employment Variables**

The impression of the serviceman that he is very likely to find a good civilian job, should he leave the service, significantly affects the decision to reenlist, more so than what is found in the reserve intentions model. The higher the likelihood of finding a good civilian job, the less likely the serviceman is to reenlist. In the reserve model, only in the Air Force was this variable found to significantly affect the reserve decision, though the expected negative coefficient signs were consistent across the four services. What exactly is meant by "good" job is not clear, whether it means increased salary, a better working environment, more favorable non-pecuniary benefits, etc. is not evident within the 1985 DoD Survey, leaving room for more in-depth investigation.

## 5. Tenure Variables

Neither advancement pace nor length of service consistently demonstrated a significant impact on reenlistment or reserve affiliation intentions across the four services. For the reenlistment decision, only length of service in the Army, and advancement pace in the Navy were significant in affecting reenlistment intentions. This indicates that the more time in service (Army) and the quicker a sailor makes rate (Navy), the more likely he is to reenlist. With one minor exception, the quicker a serviceman gets advanced, and the more time he has invested in the service, the more likely he is to reenlist.

In the reserve model, both advancement pace and length of service positively and significantly affected the intentions of joining the reserves for the Marine Corps, while length of service was found to have a significantly negative affect on reserve affiliation intentions in the Navy. Neither length of service or advancement pace significantly affected the reserve affiliation intentions of Air Force respondents. In the Navy and Air Force samples, both of these variables showed a negative relationship to reserve affiliation intentions, implying that the more rapid the advancements and lengthier time in service, the less likely the serviceman is to join the reserves, again a counterintuitive finding. One possible explanation for these negative reserve model coefficients may lie in the interpretation of the reserve participation question by Navy and Air Force respondents. Owing to the positive length of service coefficients in both the Navy and Air Force reenlistment models, it is conceivable to interpret the negative reserve length of service coefficients as the confirmation of the finding that intent to reenlist is stronger with more time in service. This then implies that since the serviceman is less likely to leave the active forces, he is, therefore, less likely to join the reserves. This rationale would then account for negative reserve model coefficients for length of service.

The significant negative bivariate correlations of length of service with the reserve intentions dependent variable, coupled with the strong negative bivariate correlation of the advancement pace and length of service variables in the Navy and Air Force samples may account for the negative advancement pace coefficients for these two services in the reserve intentions model. The overall insignificance of these variables in the Navy and Air Force models supports the conclusion that their negativity does not adversely affect the reserve model accuracy.

## B. IMPLICATIONS

The cohort of servicemen reenlisting for a second term in the four services will contain more non-white, generally older, and more family-oriented men. The cohort of servicemen most likely to join the reserves once they leave the service will also be non-white and family-oriented, but younger than the reenlistment cohort. Thus, manpower policymakers appear to have leverage in increasing the likelihood of continued military affiliation, either through reenlistments or reserve participation, by tailoring incentives and/or policies toward the quality of military service life issues. Policies which foster improved job environments, as well as provide for more satisfying family services, such as expanded medical and dental care for dependents and improved housing availability, should tend to increase the likelihood of continued military affiliation : full and part-time.

While military pay and total family income did not directly influence the likelihood of continued military affiliation for this particular survey sample, the significant effect of the level of debt on the reenlistment decision shows that higher debt levels can be adequately met with current military pay and allowances. This also presumes that adjustments to military pay and allowances through the first half of the 1980's were sufficient enough to not cause military pay and total income levels to become significant issues for this particular survey sample. Manpower policymakers must continue to closely monitor military versus civilian wage compensation levels to ensure servicemen continue to believe that military associated income is as adequate (hopefully more) than wage compensation in the civilian sector to liquidate outstanding debts.

Civilian employers have a great influence on the reenlistment decision. Outside of the flexibility of offering higher than military wage rates, particularly to technically trained servicemen, civilian firms have generally improved benefit packages such as pensions plans, fully funded medical and dental insurance plans, and paid vacation incentives to attract high quality workers. The fact that a tremendous amount of general training has been acquired by service trained technicians at no cost to competing civilian employers makes these men a most attractive target for competitive bidding. Again, this study has shown that satisfaction with military job security, steady income, and attractive medical and retirement benefit packages are weighted heavily in the reenlistment decision and must be maintained and improved if the services are to retain their skilled work force.

### **C. RECOMMENDATIONS FOR FUTURE RESEARCH**

Data on satisfaction of military personnel as provided in the 1985 DoD Survey have focused principally on absolute levels of satisfaction, failing to capture the extent to which servicemen are satisfied with the military work and life environment relative to civilian labor market alternatives. Echoing the views of Stolzenberg and Winkler, (1983), the decision to continue military affiliation either through reenlistment or reserve participation would be more completely investigated through comparisons of perceived alternatives of the military versus civilian labor market rather than through absolute measures of solely military satisfaction levels as was necessitated by the nature of the 1985 DoD Survey. It is recommended that data regarding perceived satisfaction with civilian labor market participation, as were available in the Rand 1978 DoD Survey, be included in all future DoD Surveys of Officer and Enlisted personnel.

This study made inferences of likely military affiliation behavior based on respondents' stated intentions rather than actual decisions. A more thorough study of the reenlistment/reserve decision would be better accomplished through the use of a longitudinal data base which would provide measurements of the actual affiliation decisions made by respondents. Data collection at especially the entrance and termination points for both the active and reserve forces would be extremely useful in verifying findings inferred from similar cross-sectionally based studies.

The decision to continue military affiliation has been shown to be more complex than a simple dichotomous yes/no decision. The application of more sophisticated process models, such as multinomial logit, should be applied to the 1985 DoD Survey data set for comparison with findings of this study. Such models could provide for dramatic advances in understanding more complex decision issues.



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